Atlas of Liposuction

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Melvin A Shiffman

Foreword
Pierre F Fournier

JAYPEE

Atlas of LIPOSUCTION

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Foreword

It is with great pleasure that, I accepted the offer of Adrien E Aiache to write a foreword to his book on liposculpturing. I consider this to be a privilege and honor for two reasons, the quality of the author and the quality of the book.

It was in Rio de Janeiro in February of 1972 at the first meeting of Aesthetic Plastic Surgeons that I met Adrien and we became friends at once for medical as well as social reasons; both of us had a similar professional education, a double medical education consisting of basic medicine acquired in France and specialization abroad. Throughout the years, Adrien has been able to preserve and develop his French clinical education and associate it with the exceptional theoretical and practical education offered to plastic surgeons in the United States.

If his “graft” to California has fully succeeded, he has also maintained a cultural bridge with his country of origin and it is because of this “French Connection” that he has been among the pioneers of liposculpturing and been able to share this knowledge with his American colleagues.

In February 1982, as I was returning from Lake Tahoe, after my first presentation in North America of a new defatting procedure in esthetic surgery of the head and neck, Adrien and I met in Los Angeles and discussed the new possibilities offered by this procedure. Soon after, Adrien accompanied by some other plastic surgeons, flew to Paris to attend the first course on liposculpturing, even in Paris, with YG Illouz, the great simplifier and popularizer of the original technique of Giorgio Fischer. Upon his return to California, he passed-on his experience with “surgery from within” and actively participated in its development in the States, both solely and working with other surgical groups.

Although this new procedure of closed body contouring was a significant advance on the conventional open techniques, in 1982, we were only at the stage of lipoextraction. It is only with years of practice that we have advanced to the era of true liposculpturing. As a matter of fact, even if we had all the proper instruments needed to extract the excess adipose tissue at that time, we did not yet know (and had to develop) the procedures needed to perform this new surgery safely and with as few complications as possible. In a word, the surgeon has to shift from the position of a miner and become an architect.

Adrien has been a witness to an actor in all these improvements including the development of the better understanding of the operation, the refinements which he describes today in his book, miniaturization of the instruments, study of the static and dynamic morphology of the patient, patient selection, external and internal cryoanesthesia, the routine use of vasoconstrictors, the accomplishment of the peripheral mesh undermining, the direct approach, the combined procedures and cases of the treatment of zones previously considered taboo, the first cases of circular lipoplasty, microlipoextraction and injection, histological studies, etc.

Adrien is not only a winner but also a leader and, in 1986, he founded ASPER capably assisted by his wife Sylvie. The first meeting of this group was very successful as were those following. By carefully selecting his faculty members, the students were presented with the latest advances in esthetic plastic surgery and in the field of liposculpturing. The lipoplastic surgeon was shown for the first time such subjects as incremental liposculpturing, autologous collagen, microlipoextraction and injectable soft tissue implants.

This book of high quality, written by a highly qualified lipoplastic surgeon, describes step by step the history, basic theory and a very thorough study of all special areas of the body and the different cases coming to the lipoplastic surgeon.

Breast reduction with suction lipectomy, one of the author's earlier contributions to liposculpturing is given special attention as well as gynecomastia combined techniques, face-lift combination with suction lipectomy and arm lipectomy.

Autologous fat re-implantation, which was at that time a very controversial subject, is evaluated and its goals explained.

Complications are also described and the study of those chapters will properly educate the reader.

The book should be read not only by beginning lipoplastic surgeons but also by the well-trained operator. He will learn many refinements, finesses, tricks and unusual procedures that Adrien has accumulated over the years, through his own extensive experience and through the experience of visiting professionals, and is now sharing with the surgical community.

Thank you, Adrien, for presenting such an insightful, useful and carefully written book to your colleagues, who with you, are fighting in the battle of body contouring, modifying the human body without scars and with a minimum of complications. Since you waited so many years before writing this book, the readers are assured that it is a reliable one, the full experience of an experienced plastic surgeon who is also an outstanding lipoplastic surgeon in the most recent and significant advances in esthetic plastic surgery. I praise you for your wonderful contribution to liposculpturing, for your honesty and for your loyalty about this new exciting and difficult "surgery from within" as well as for increasing the circulation of the cultural bridge connecting Europe to America, which gave to your book its quality.

Finally, you demonstrate with the work, you have achieved that you are a living example of one of the famous quotes of Mario Gonzales Ulloa:

"The essentials in life are:
Not in having but in giving,
Not in knowing but in teaching,
Not in being able but in accomplishing."

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Preface

Atlas of Liposuction presents an exhaustive survey of the current techniques in suction lipectomy. This new operation was devised for removal of localized fat deposits. After a short introduction covering basic theory, preoperative procedures and general techniques, use of the liposuction on each specific area of the body is discussed in detail. These discussions cover the exact modus operandi, including such matters as incisions, positions and instruments. Many color photographs and illustrations showing actual clinical cases are included as an integral part of the text.

Through these volumes, the reader will be completely apprised of the techniques involved in liposuction and can then refer back to specific chapters for help in solving problems or reviewing any areas of special interest. Because of the number of different cases presented and the various techniques used, we feel that this book will be of interest to even the well-versed surgeon in this area, as well as to the operating surgeon with relative modest experience in liposuction and the student wanting to learn the entire procedure. For any practitioner, regardless of experience, this book will serve as a complete guide to the full range of techniques used in liposuction.

Note that a significant new advance in the field—the re-introduction of fat into the depressed areas and wrinkles—has been included at the end of the Atlas. While this technique took a while to be accepted by the general plastic surgery practitioner, we feel that it is likely to become a precious and effective tool in body and facial contouring.

Other significant improvements such as superficial liposuction, laser liposuction and ultrasound liposuction are discussed in this book since they have been emerging as the last improvements in the technique of liposuction.

Adrien E Aiache
Melvin A Shiffman

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1 History of Liposuction

Melvin A Shiffman

ABSTRACT

The history of how liposuction developed and progressed allows the surgeon to see what the problems were and understand how they were solved. This is necessary to be able to develop further improvements in the future. The author will follow the changes in fat removal, step by step, so that the liposuction surgeons can understand how to avoid the problems that have been resolved by improved instruments and techniques.

Introduction

The liposuction surgeon should be able to adjust to new developments and improve his/her own technique.

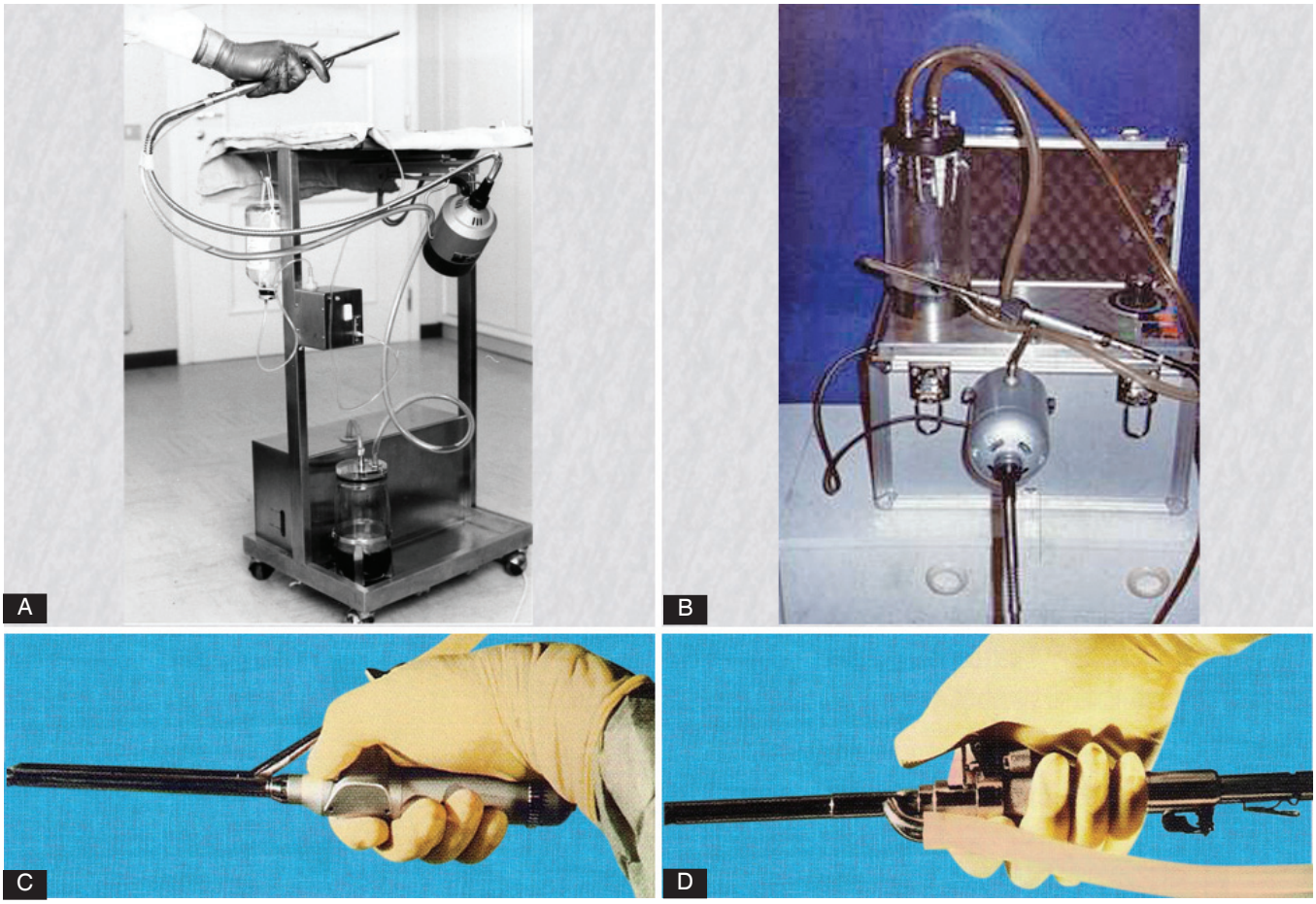
History

Dujarrier (1921)[1] reported a case of using a sharp curette to remove fat of calves and knees that resulted in blood vessel injury, and necessitated amputation. Pangman[2] performed curettement of the submental fat using a small uterine curette in 1940s.[3] Schrudde used a sharp curette to remove fat through small incisions.[4] The technique resulted in complications including bleeding and seromas.[5,6] Vilain curetted fat in the medial knee through a small incision with good results.[7,8] Kesselring developed a metal suction cannula designed like a ski that was attached to a low vacuum pump (0.5 atm) and was used only for the trochanteric area.[9] The fat was shaved out in a modified curette fashion. Teimourian and Fisher (1981)[10] produced an instrument from a fascia lata stripper that was similar to the curette used by Kesselring. Early removal of abnormal fat deposits was performed by surgical excision trying to keep the resultant scar in a line or fold of the body.[11]

Liposuction

The concept of reducing fat deposits without leaving large scars was started by Arpad and Giorgio Fischer in 1972, and by 1974, a prototype machine called the cellusuctiotome (Fischer G, personal communication, September 13, 2008) **(Figures 1-1A to D)** was developed. This device was a motor-driven cannula with a rotating cylinder inside which was used to cut fat and was connected to a suction machine.

The cutting cylinder inside the cannula could be used by pressing a lever. Fischer, in 1975 and 1976, reported utilizing a 5 mm incision to remove fat with suction using a blunt hollow cannula to aspirate subcutaneous fat.[13,14] The cellusuctiotome was produced in a portable and a nonportable form.[15] There were complications such as hematoma, seroma and pseudobursa, reported in 1977.[16] The Fischers can be credited with other developments



FIGURES 1-1A TO D

(A) First prototype suction machine with a motor-driven cannula; (B) Second prototype motor suction machine; (C) Motor-driven cannula with cutting and rotating cylinder inside; (D) When thumb released there is no aspiration
(*Courtesy:* Giorgio Fischer)

such as tunneling and the use of cross-tunneling technique, in which the fat is aspirated from multiple entry sites. The planatome was brought into use in 1977 for trying to solve the problem of skin irregularities due to blunt liposculpturing **(Figure 1-2)**.[17] The planatome dissector created a layer of adipose tissue 8–13 mm thick under the skin and regular liposuction was used for the deeper layers using a guide.[15] In 1982, a guided cannula was produced with a second overlying slide that moved over the surface of the skin, while the suction cannula worked at a depth of 1.5 cm.[12] At the same time, the swan-neck cannula was developed to make it easier for the surgeon to maintain a constant depth in the fatty layer[12] **(Figure 1-3)**.

Fischer introduced liposuction at Fournier's clinic in 1977 **(Figure 1-4)**. Illouz, having seen the technique at Dr Fournier's clinic, favored a "wet technique", in which hypotonic saline combined with hyaluronidase was infiltrated into the adipose tissue prior to suction

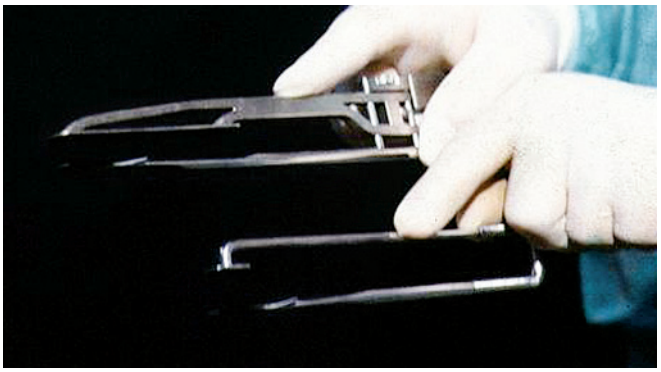


FIGURE 1-2

The planatome
(*Courtesy:* Giorgio Fischer)

removal.[18] He felt this would reduce trauma and decrease bleeding. He mistakenly thought that the solution ruptured the fat cells. His techniques also included the use of the Karman cannula and abortion suction machine.

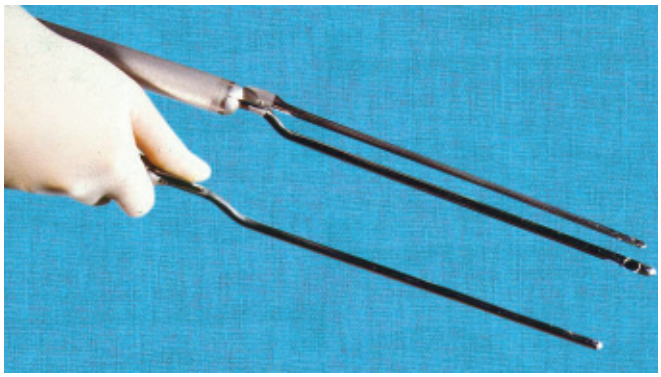


FIGURE 1-3
Swan-neck cannula and guided cannula (first prototype) (*Courtesy:* Giorgio Fischer)

FIGURE 1-4
Clinic where the first liposuction operation was performed with Fournier in 1977 (*Courtesy:* Giorgio Fischer)

Fournier developed the syringe technique of liposuction[19,20] that reduced bleeding and prevented indentations.

Gasparotti and Toledo[21-24] championed the technique of superficial liposuction to smooth out excess fat and to improve skin retraction.

Orthostatic liposuction was originated in 1990s by Fischer; in order to perform liposuction more accurately with the patient in a standing position.[25] He developed a table, that could bring the patient from supine position to an upright position. This allowed reversing the table to supine position, if the patient became dizzy or fainted.

Variations in instrumentation have also been developed. Ultrasonic liposuction was introduced by Zocchi.[26] The concept was that adipose cells could be treated with ultrasound energy, presumably breaking up their cell walls and facilitating fat aspiration. The American Society of Plastic and Reconstructive Surgery quickly adopted ultrasonic liposuction; however, over time, problems were found with this technique. Internal ultrasound (ultrasound tips contained within cannulas) increased the risk of cutaneous burns and seroma formation.

Newer powered liposuction devices have been developed using reciprocating cannulas that facilitate the fat removal and decrease the work of the surgeon. Powered liposuction devices are largely electrically operated but some air-driven devices are also available.[27] There is an increase in the rate of fat harvesting and the ease of use. Powered liposuction is particularly useful for difficult fibro-fatty areas such as male pseudogynecomastia or male love handles.

Elam proposed lower vacuum pressure that is successful in preventing or reducing bleeding during liposuction.[28]

External percussion massage-assisted liposuction was reported in 2005,[29] as a substitute for expensive devices for emulsifying fat and making liposuction easier. The $30.00 double-headed massager caused emulsification of the fat.

The earliest book on liposuction was written by Morgan and Berkowitz (1984),[29] and this was followed by later books.[19,20,24,30-39]

Guidelines of care for liposuction were approved by the American Academy of Dermatology in 1989 and were published in 1991.[40] Additional guidelines of care for liposuction were published by the American Academy of Cosmetic Surgery, the American Society for Dermatologic Surgery in 2000,[41] the American Academy of Dermatology in 2001[42] and the Indian Academy of Dermatology, Venereology and Leprology in 2008.[43]

Tumescent Technique

In the early days of liposuction, the dry technique was used with general anesthesia. The technique used had no fluids injected into the tissues and resulted in 20% to 45% blood loss.[40,43-47] Liposuction was limited to 2,000–3,000 ml because of the blood loss and patients were frequently given transfusions.[44]

The wet technique relies on infusions of 100–300 ml of normal saline into each site but has blood loss of 15% to 30%.[48-52] With epinephrine added to the fluid, the blood loss is reduced to 20% to 25%.

The tumescent technique has improved the problem of blood loss reducing it to 1% to 7.8%.[53-55] The term "superwet anesthesia" has been used to describe the same fluid injection as with the tumescent technique.[56] This technique consists of an infusion of saline with epinephrine and an aspirate removal of approximately 1:1. Local tumescent anesthesia usually has a fluid infusion to aspirate ratio of 2:1 or 3:1.

Local Tumescent Anesthesia

There appears to be much confusion in the medical literature concerning Klein's solution. No one is certain as to what the so-called Klein's solution contains and what a modification of Klein's solution is.

Klein first reported the use of local tumescent anesthesia in 1987.[57] The report described solutions used that consisted of:

- For general anesthesia:
  - Normal saline: 1,000 ml
  - Epinephrine: 1 mg
- For local tumescent anesthesia:
  - Normal saline: 1,000 ml
  - Epinephrine: 1 mg
  - Lidocaine: 1,000 mg

The amount of tumescent solution compared to removal of aspirate was 1:1. This is Klein's solution and all the rest are modifications.

Klein, in 1990,[58] showed that 35 mg/kg was a safe amount of lidocaine to be used for local tumescent anesthesia. The solution utilized at that time consisted of:

- Normal saline: 1,000 ml
- Epinephrine: 1 mg
- Lidocaine: 500 mg
- Sodium bicarbonate: 12.5 mEq

Klein, in 1993,[54] had changed the local tumescent anesthesia solution to:

- Normal saline: 1,000 ml
- Epinephrine: 0.5 to 0.75 mg
- Lidocaine: 500 to 1,000 mg
- Sodium bicarbonate: 10 mEq
- Triamcinolone: 10 mg (optional)

The mean tumescent solution compared to total aspirate was 4609 ml: 2657 ml or almost 2:1.

By 1995, Klein[59] had changed the tumescent formula to:

- Normal saline: 1,000 ml
- Epinephrine: 0.5 to 0.65 mg
- Lidocaine: 500 to 1,000 mg
- Sodium bicarbonate: 10 mEq
- Triamcinolone: 10 mg

In 2000, Klein[60] described a variation of drugs, in the local tumescent solution, according to the area being liposuctioned. The basic solution to be changed after checking for anesthesia completeness was:

- Normal saline: 1,000 ml
- Lidocaine: 500 mg
- Epinephrine: 0.5 mg
- Sodium bicarbonate: 19 mEq

If the anesthesia was not adequate then a variety of formulations were proposed for each area of the body and ranged from lidocaine of 750 mg to 1,500 mg, epinephrine from 0.5 mg to 1.5 mg,[54,56-65] and sodium bicarbonate of 10 mEq.

Local tumescent anesthesia is used as the anesthetic for performing liposuction, especially with small cannulas (microcannulas). The same fluid can be used with conscious sedation to provide the necessary local anesthesia.

Ostad (1991)[66] proposed that the maximum safe tumescent lidocaine dosage was 55 mg/kg.

Gross et al (1995)[67] introduced a soft tissue shaving cannula that shaves the fat in an open fashion under direct vision.

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2 Preliminaries

Adrien E Aiache

ABSTRACT

Preliminary aspects of liposuction cover discussions on subjects such as the patient's point of view, historical background, scientific and esthetic basics for successful liposuction, basic principles, patient selection, candidates for surgery, physical examination, esthetic considerations, preparation of the patient, preoperative laboratory tests, anesthesia, blood and fluid replacement, and surgical technique.

The Patient's Point of View

Curvaceous lines are and have usually been considered an asset to the feminine body. Many women, however, are not actually happy with their own "lines" and are seeking ways to reduce their round shapes in order to remain fashionable. Even moderate areas of fat deposits are presently regarded as unattractive by many patients. The trend in fashion and beauty care is towards the very slim, thin, and even muscular silhouette.

Never before have exercise rooms and programs been so prevalent and numerous. The health and fitness craze is expanding continuously. Young people spend a great deal of time and effort in body improvement programs. This interest in image improvement has opened new areas for plastic surgeons, who are now seeing in their offices the kind of patients who were never asking for help before.

Before the development of liposuction, all that plastic surgeons could offer such patients was a series of mutilating operations. In attempting to contour the body, their surgery resulted in extremely large, ugly, troublesome scars. The arms, the thighs and the abdomen were often the location of such scars. For other areas, such as the knees and the ankles, no treatment at all was available, while for some areas such as the breasts and the neck, the treatment available was inadequate.

Today, liposuction has added an entirely new dimension to body contouring treatment, making great changes in body contour possible without leaving the horrible scars caused by past treatments. As such, liposuction must be considered the most important development in body contouring in the past decade.

Historical Background

In the early part of the twentieth century, attempts were made using a uterine curette to scrape out fat deposits in the leg and knee areas. These attempts often mitigated the build-up of fat. However, for the most part, this surgical approach to fat excesses required large excisions of skin and fat (called dermolipectomy) resulting in large scars.

In 1972, Schrudde[1] reintroduced the procedure of curetting for fat ankles. Then in 1977, Fischer and

Fischer,[2] and Kesselring and Meyer in 1978[3] improved on the technique by introducing a new element: liposuction.

It was not until Illouz, in 1977,[4] that the procedure became less prone to complications due to the new idea of using a strong suction through a blunt opening without incisions. Many minor modifications in that technique have subsequently developed and the procedure has enjoyed tremendous expansion becoming the most practiced cosmetic operation. This atlas expands on the basic principles of liposuction in an attempt to teach the different aspects of the procedure to the uninitiated and to present the basic knowledge of this surgical technique.

Scientific and Esthetic Basics for Successful Liposuction

- There is a difference between metabolic fat, which is gained and lost easily, and blocked fat which is difficult to lose easily. Blocked fat in men is found around the waist and it is found around the hips and the saddlebags in women.
- Bjorntorp[5] has determined that fat cells do not multiply and in cases of removal of the "reserved fat", there is no return making this removal definitive.
- After suction, which creates tunnel-shaped extractions of fat and respects the septae, there is a certain amount of skin retraction which is possible due to the contracting elements below the skin.

  The additional belief is that the superficial suction, which is done immediately under the dermis, will be an important factor in skin retraction. The fat is soft and relatively poorly vascularized, allowing its removal with blunt suction without the necessity of cutting, and without too much blood loss. This has been the most startling and positive contribution—since this is the only tissue in the body that can be removed by aspiration, making use of the knife unnecessary.

Basic Principles

When looking at the skeletal shape and fat distribution, one realizes a fact that all human beings are essentially built the same way, however, differences are present in shapes and are either racial or ethnic or are due to excessive fat deposits.

The surgeons can do little to correct skeletal body contours as determined by genetics. However, with liposuction the surgeons can in many ways alleviate the deformities that people have brought upon themselves by overeating and failing to exercise.

The simple aspiration of excess fat in some areas will improve the beauty of a body in a permanent fashion. This is due to the properties of fat cells; although the fat cells can grow, it is understood that after puberty their number is determined and they are unable to multiply. This simple removal prevents the recurrence of an ugly deformity.

The special characteristics of fat tissue (its softness and the little amount of connective tissue) makes it relatively easy to aspirate and allows for preservation of the important structures such as arteries, veins, nerves and lymphatics. This is an important fact in view of the "new" techniques such as laser and ultrasound that destroy tissues indiscriminately.

Some important factors that allow the technique to work are:

- The fat is soft and is contained in a loose tissue network
- Strong suction causes avulsion of the fat from its bed
- Using blunt instruments preserves vital structures (nerves, arteries, etc.)
- The retractive properties of the skin allow it to collapse over its new surface
- Preservation of most of the skin vessels and veins allows good vascularization and the possibility of even restructuring over a new bed.

Liposuction, however, cannot be successfully used to treat a number of conditions such as:

- Striae, which consist of epithelial tears caused by sudden expansion of the skin (as with obesity or pregnancy, **Figure 2-1**).
- Skin flabbiness and redundancy will not only fail to improve after liposuction but can often take a worse-looking appearance. An obese woman who has the beginning of an apron or a sagging face will show an accentuation of the apron and of the nasolabial grooving. For any case in which there is an excess of skin, the liposuction technique will result in deeper folds and more flabbiness, and only by returning to the older method of dermolipectomy can the surgeon improve this problem of skin laxity, excesses and folding. In a limited number of cases, superficial liposuction can help in the retraction of the skin and it may sometimes prevent the necessity of using dermolipectomy **(Figures 2-2 and 2-3)**.
- Liposuction cannot be used thoroughly for what the French call cellulite. A superficial layer of fat deposits, which have increased in size and are under tension because they are retained by skin and subcutaneous connective strands, distort the surface causing the cellulite's typical appearance. This layer responsible for cellulite formation is more superficial than the usual fat

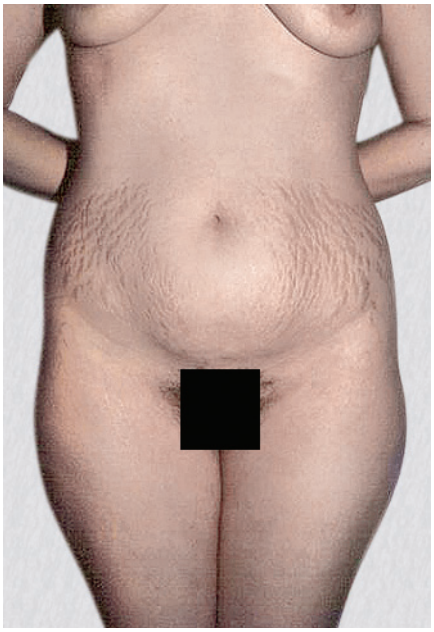


FIGURE 2-1
Stretch marks will not improve after suction lipectomy, however, the abdomen can be flatter

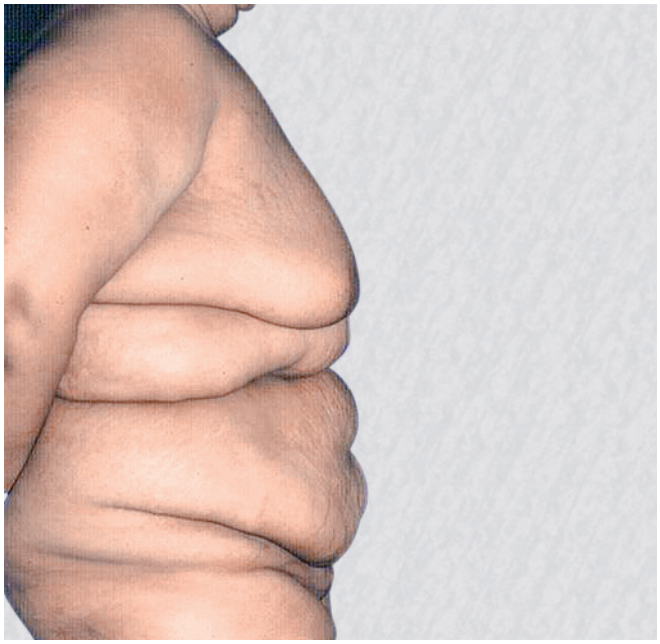


FIGURE 2-2
Liposuction alone is not indicated in this type of excess skin and flabbiness. Only an abdominal lipectomy is the solution

that is suctioned surgically. The new technique of superficial liposuction with a cutting cannula, for the cellulite strands and the autologous fat implantation under the defect, is helpful in a moderate number of cases and can correct the cellulite in a relatively modest percentage of cases **(Figure 2-4).**

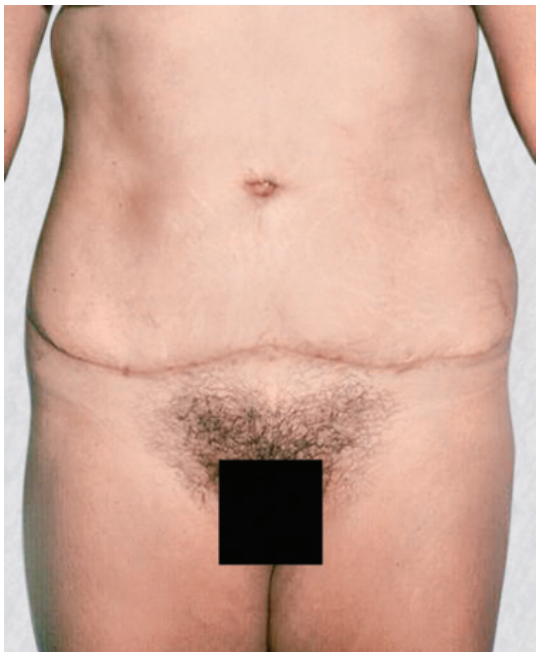


FIGURE 2-3
The technique of abdominal lipectomy does not satisfactorily deal with the problems of excessive scarring and both body distortion and usually ends up with a deformed abdomen

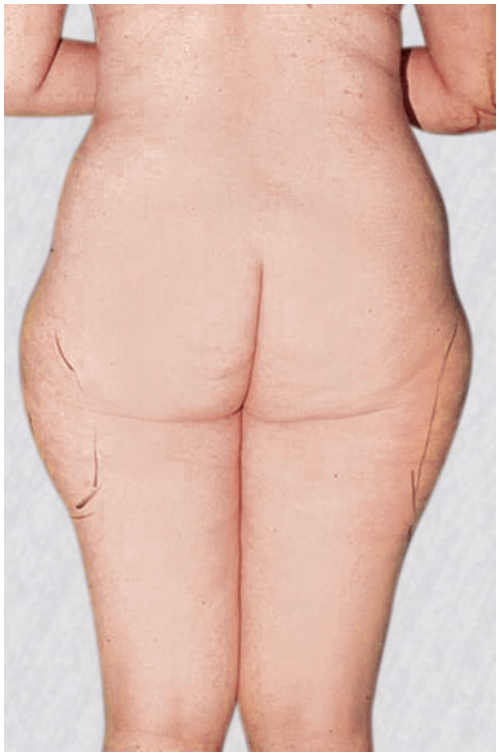


FIGURE 2-4
Patients with cellulite respond poorly to liposuction, unless it is associated with superficial liposuction and cellulite release using a sharp instrument to release the cellulite bands

It is always a good idea and a good practice to indicate on the schematic drawing the exact extent of the fat deposits to be treated and to record these drawings photographically. An informed consent associated with the markings will often help in protecting the physician in any medical-legal problems.

Selection of Patients

A key to success is proper patient selection. First and foremost, a psychological evaluation in addition to a physical evaluation will help to avoid problematic cases. The psychological evaluation should consist of analyzing the patient: avoiding the unstable, the psychologically sick and especially the patient who has unrealistic expectations. The patient with unrealistic expectations, although psychologically normal, might present problems just as severe as the psychologically abnormal patient.

It is important to ask proper questions from these patients in order to evaluate their psychological and emotional makeup. Often the physician is too eager to perform the surgery, not realizing that an untoward result or a result that is not completely satisfactory to the patient will cause problems that could have been avoided in the first place. Proper questioning will orient the surgeon by allowing him to assess the amount of knowledge that the patient has accumulated concerning the surgery, and will allow proper evaluation of the amount of expectation that the patient has (the hopes that they have placed in the potential improvement that they may think could change their life). Though there are exceptions, it is the experience of the author that this type of surgery does not change anyone's life and does not solve the problems that the patient had before the surgery.

An ideal patient is less than 35 years of age, relatively thin with a localized contour deformity consisting of excess fat with smooth and tight skin coverage. Cellulite, skin sagging, skin with striae and irregularities from contour defects constitute poor indications for the surgery.

In stretching the indications for surgery somewhat, one may treat some patients over 35 years of age who are slightly overweight, and present cellulite, striae and sagging skin, provided that they understand that the surgical result will be less than ideal. This specific point is often a cause of misunderstandings and dissatisfaction, and should be clearly explained before surgery **(Figure 2-4).**

Candidates for Surgery

Candidates for surgery may possess any of the problems that are listed in **Table 2-1.**

TABLE 2-1

Problem areas encountered in candidates for surgery

Face:
❖ Fatty "turkey gobbler" neck
❖ Fat cheeks
❖ Nasolabial fat (or melolabial)
❖ Jowls
❖ Nape of the neck fat
❖ Malar bags
Body:
❖ Fat breasts
❖ Fat back—subscapular, dowager's hump
❖ Abdominal protrusion
❖ Epigastric bulge
❖ Lack of waist or love handles in males
❖ Iliac crests
❖ Lumbar bulge
❖ Saddlebags excess
❖ Fat buttocks
Extremities:
❖ Fat inner thighs
❖ Fat thighs, lateral medial and anterior
❖ Fat knees, medially and anteriorly
❖ Fat ankles
❖ Arm redundancy, excess fat in the posterior part
❖ Fat necrosis with "false fat bulges"
❖ Post-traumatic

Physical Evaluation

Many so-called "tests" have been devised to ensure a better understanding in the decision-making process of surgery. The appearance test, the palpation test and the lifting test have all been described by Illouz.[4] The poor, wavy appearance of the skin may discourage the surgeon. Palpation will show the turgor or the lack of it, predicting possibly a poor result, even when the fat layers have been reduced. The lifting test consists of elevating the buttock, thus removing the excess of saddlebags. This will indicate an excess of skin and droop of the buttock which will respond poorly to liposuction.

The "buttock contraction" is similar to the lifting test in its effect of reducing the saddlebags. The riding britches do not disappear when the patient contracts her buttock; these can be safely suctioned. The muscle contraction that takes place in the buttock will actually tighten the layers of fat by telescoping them on top of the muscle and, thus, change the possibility of estimating the right amount of fat to suction. The so-called dynamic pinching test (with the muscle contracting) as opposed to

the static pinching test (with the muscle relaxing) is, thus, not to be used to decide on the amount of suction to be performed.

Using the trimming test (lifting the buttock will reduce the fatty deposits), the surgeon can direct his attention not only to the riding britches but also to the buttocks, the hips, or the iliac crests.

The reclining test will show how much of a deformity is due to simple skin excess and redundancy by watching the patient in standing and lying positions. This is a phenomenon called pseudodeformity of the saddlebags, apparently secondary to the excess of the buttocks. To correct this deformity, only buttock suction will help.

Pinching the skin between the thumb and the index finger will actually define the amount of fat present in any area of the body. This test is extremely useful and stable and will be as efficient as computed axial tomography (CAT) scans, ultrasonography, and magnetic resonance imaging which are also useful but only in an academic environment for the documentation of the fat layers. The criteria for selection of patients is listed in **Table 2-2.**

TABLE 2-2

Criteria for selection of patients

Select patients with:
❖ Good skin tone
❖ Smooth skin surfaces
❖ No waves, depressions or cellulite
❖ Moderately hypertrophic area to be treated
❖ Older patients willing to settle for a modest improvement

Esthetic Considerations

Removal of fat deposits by liposuction should not be considered as a treatment for obesity, however, lately this treatment has been used in very obese patients and has increased the number of fatalities which was extremely low with pure liposuction. If it is obvious that the patients are candidates for liposuction even if they are relatively obese, their shape will be helped by this technique.

The location of the excessive fat determines the ultimate success of the operation. Localized, well-defined excesses present under a taut, firm and young skin will give optimal results if the technique is well performed by the surgeon. Removal of excess of fat present under soft, old, redundant and flabby skin will often result in a poor esthetic result even if it is performed by a well-trained operator.

The patient who is older with redundant flaccid skin should either be rejected or relegated to an associated treatment consisting of a suction associated with dermolipectomy. However, one has to keep in mind that possible improvement can be obtained by superficial liposuction and cellulite release.

The alternatives prior to liposuction involved procedures such as trochanteric lipectomy **(Figures 2-5 to 2-8)**, abdominal lipectomy, brachioplasty and dermato-crurolipectomy. These procedures had a number of drawbacks: scars were extensive and hard to hide, deformities were not fully corrected, and they produced secondary deformities such as dog-ears and expressionless abdomen. There was also an inability to prevent localized recurrences with increased obesity and also areas could increase or recur in spite of surgery. Some of the words of wisdom are given in **Table 2-3**.

TABLE 2-3

Some words of wisdom

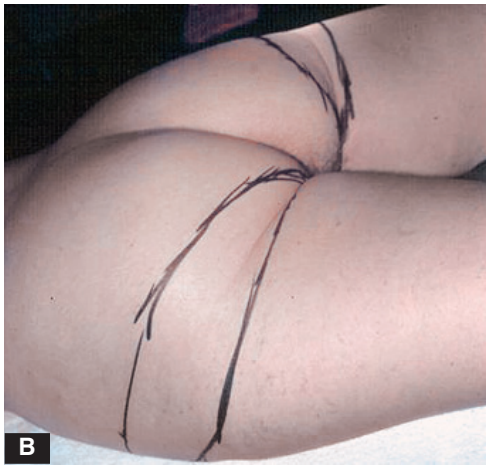
Some don'ts
❖ Cellulite improves only moderately after liposuction if it is associated with a cellulitis release technique
❖ Sagging skin occasionally responds to liposuction by shrinking-down, but most often it does not although the superficial liposuction is most useful
❖ Striae and stretch marks do not improve after liposuction
❖ Wrinkled skin does not respond to liposuction

The new techniques of superficial suction and cellulite release help somewhat in improving the conditions mentioned above that were impossible to correct in the past.

Preparation of the Patient

The first contact with a new patient will allow the surgeon to recommend a few procedures and assess the potential risks that this patient presents from the physical, psychological and even financial standpoint.

The usual checkups, especially for bleeding problems and for potassium deficiencies, in patients who are dieting or who are on thyroid treatment, should be performed. Patients with medical problems as well as patients who have poor skin tone or inordinate degree of obesity and whose preoperative tests show deficiencies, such as low potassium, bleeding disorders or cardiovascular abnormalities, should be excluded. Obesity itself, although



FIGURES 2-5A TO C

(A) Markings made for trochanteric lipectomy. This surgical excision is rarely performed nowadays; (B) Lateral view of markings for trochanteric lipectomy; (C) Large lipodystrophy excision

FIGURE 2-6

Postoperative scars after lipectomy

FIGURE 2-7

Postoperative result of trochanteric lipectomy. Notice the notching at the scar line and the remaining bulges over an area below that scar

FIGURE 2-8
Even properly placed thin scars can present a cosmetic disfigurement in the era of high-strung bathing suits

not a contraindication, will not be corrected by this treatment alone except if it is performed as a megaliposuction, which is a procedure limited to patients in good shape and is performed by a very small number of very knowledgeable surgeons in this subject.

The patient's age is the single most important factor since an old skin will not shrink as much as a younger one and an excessively redundant skin will not drape over the defatted area.

Preoperative Laboratory Tests

- Complete blood count (CBC): Borderline anemia should be considered a possible contraindication to the procedure since the condition will be worsened by the blood loss inherent with the procedure (20–50% of the aspirated material can be blood).
- Fasting blood sugar (FBS): Diabetes, although not a contraindication in itself, will have to be stabilized in order to avoid postoperative problems.
- SGPT, HBSA: To detect hepatitis since it is as prevalent and as dangerous as AIDS.
- HTLV-III: Determination to detect AIDS antibodies.
- Bleeding workup
- PTT and bleeding time: Any abnormality in this test will be a definite contraindication to the procedure since no hemostasis can be performed except for actual pressure on the bleeding area.
- Potassium (K^+): Particularly important is its determination in older patients with cardiac disorders who have been on diuretics or on thyroid medication, since these medicines are notorious for having an impact on the potassium level.
- Dibucaine number: Also obtained to detect many cholinesterase deficiencies.
- Fibrinogen level: Important in the preoperative bleeding workup in patients taking anabolic steroids who sometimes have a deficiency.

Health risks are listed in **Table 2-4.**

TABLE 2-4

Health risks

The factors listed below should be considered when screening a potential patient.
Age:
❖ Under 50 preferred
Hypertension:
❖ Poorly controlled hypertension
❖ Coronary artery disease
❖ Six months following a myocardial infarction
Common cause:
❖ Superficial skin infections
Coagulation profile:
❖ PTT
❖ Aspirin intake
❖ Obscure clotting problems (history, dental experience)
❖ Hypercoagulation status
❖ Diabetes
❖ Obesity
Habits and risks:
❖ Smoking
❖ Alcoholics
❖ Skin pigmentation
❖ Ready vomiters
❖ Steroid use
❖ History of narcotic use
❖ Tranquilizer use
❖ Allergies
❖ Topical reactions

Anesthesia

Anesthesia can be general but even under complete anesthesia, whenever possible, the operator should also infiltrate the area to be operated upon with a diluted solution of xylocaine and epinephrine. A normal amount of bleeding comes to approximately 15–25% of the total amount of fat and fluid removed during the suction

procedure but this amount can be significantly decreased by vasoconstrictive solutions injected before surgery such as epinephrine. Although the dilution of the solution has been subject to discussion, an appropriate dilution of 1:400,000 of epinephrine is the most diluted solution that can be used with appreciable results in terms of vasoconstriction. More concentrated solutions are more helpful. On the other hand, the tumescent technique is a new way of infiltrating the tissues with a large amount of fluid reducing blood loss and in these cases the dilution of epinephrine comes to 1:1,000,000. However, it seems to be successful in preventing blood loss.

The anesthesiologist should bear in mind the fact that in addition to the process of removing fat and blood from the area, a large amount of fluid shifting will result after the procedure. This process has been compared to a burn with fluid migration towards the injured area.

Proper understanding of this fluid movement and proper replenishment of the fluid loss avoids potential problems. Replacement fluids consist of saline solutions, such as Ringer's lactate, associated sometimes with colloid. If the amount of aspirate reached 2000 cc and no tumescent infiltration has been done, a transfusion can sometimes be necessary. For this purpose, the author has been satisfied with autologous transfusion which involves collecting the patient's blood approximately ten days prior to surgery and reinjecting it during the procedure. Improvements in the autologous transfusion process have been noted all over the country. People are able to "donate" their own blood two or three times prior to surgery and the blood is frozen and then reinjected at the time of surgery.

Possible complications under general anesthesia are given in **Table 2-5.**

TABLE 2-5

Possible complications under general anesthesia

Anesthesia complications
❖ Hypoxia
❖ Hypovolemia
❖ Anemia
❖ Transfusion complications
❖ Myocardial infarction (cardiac failure)
❖ Excess fluid intake with pulmonary edema and pulmonary failure with right heart failur

There are many ways of readministering blood and although at this time the techniques are not uniformly used, they are, however, helpful and can be used safely. The techniques include:

Autologous Transfusion

Autologous transfusion is the collection and reinfusion of the patient's own blood. The technique has become popular due to the fear of acquiring transfusion-transmitted diseases from homologous blood transfused from sick donors. Human immunodeficiency virus, and hepatitis B and C are still potential hazards in spite of donor screening and testing measures. The surgeon has to decide in advance who is a potential candidate for blood replacement in cases where the likelihood exists for such procedures, i.e. large suctions on obese patients or multiple areas suctioned on patients with a normal weight range.

If transfusion is likely for the planned procedure, there are three options for autologous transfusion: (1) Preoperative autologous blood donation; (2) Perioperative blood salvage; (3) Acute normovolemic hemodilution. Standards exist for proper handling, storage and transfusion of collected blood.

Preoperative Autologous Blood Donations

A preoperative autologous blood donation is given to a patient who is likely to require transfusion during or after surgery.

Selection of patients: The ideal patient for a preoperative donation is one who has two or three weeks before surgery and has an adequate hemoglobin and hematocrit. Patients with possible bacteremia are not eligible for autologous transfusion because bacteria may proliferate during blood storage or transfer. Among other procedures, such as orthopedic procedures and cardiac and vascular procedures, liposuction is now becoming a more common procedure for autologous transfusion. Most individuals can well tolerate phlebotomy loss equal to 10% of their blood volume.

Procedure: After patients are advised of the process they can give blood frequently, however, the optimal donation period begins 4–6 weeks prior to surgery. The risk of preoperative autologous blood donation includes vasovagal reactions or surgical delay. Some of the autologous blood components can be transfused instead of the whole blood.

Perioperative Blood Salvage

This is a collection and reinfusion of blood lost during and immediately after surgery. The major benefit of blood salvage is the reduction of donor exposure for patients undergoing major surgical procedures such as extensive liposuction.

Perioperative blood salvage consists of intraoperative and postoperative blood salvage. Autologous blood

collected by intraoperative blood salvages represents an excellent source of red cells during surgery and can reduce homologous blood used in surgical procedures. Commercially available equipment is used for this technique. In the particular case of liposuction, it is necessary to washout the blood to prevent the multiple fat particles formed being reinfused. This technique is rarely used at the present time.

Acute Normovolemic Hemodilution

This is the removal of blood through an arterial or venous catheter immediately before surgery. Cell-free solutions are infused simultaneously to maintain normovolemia. At the conclusion of surgery, the patient's blood is reinfused. Hemodilution is a transfusion option for patients who can tolerate repeated withdrawals of several units of blood before the period of surgical blood loss. The procedure is usually performed by the attending anesthesiologist. The safe lower limit of posthemodilution hematocrit is still unknown so the procedure should be performed carefully.

Many options for using autologous blood have been discussed. These options, although risky in themselves, are nevertheless safer than homologous blood transfusions. However, they deserve more study and more use.

Replacement of Fluids during Liposuction

Colloid recommendations for fluid replacement during liposuction are given in **Table 2-6.**

Hespan or Hetastarch is a synthetic colloid derived from amelopectin. Hetastarch increases plasma volume by up to 100% to 230% of the infused volume and the volume expansion persists for 24–48 hours. Approximately, 70% to 80% of an administered dose is eliminated renally by glomerular filtration. In situations where this colloid is considered to be inadequate for volume expansion, Hetastarch in amounts up to one liter should be used as the initial colloid. After the infusion of 1 liter of Hespan, consideration can be given to the use of albumin or even blood.

The Tumescent Technique

Prior to liposuction the area to be improved is infiltrated with large amounts of fluids. The fluid usually consists of a solution of saline 0.5% or a diluted solution of Ringer's lactate. The saline is infiltrated with a long thin cannula with multiple openings and introduced from one area and injected in a fan-type procedure all over the area to be suctioned. The movements of infiltrations are similar to the movement of suction lipectomy and the infiltration of the tissue is done to a point where the tissues are well-distended and show turgor. In order to reduce the bleeding, a solution of 1% xylocaine with epinephrine in the ratio of 1:100,000 is diluted to approximately 10 times and is injected in the same area. This allows continuous infiltration of the tissues and reduction of the bleeding. The long needle is connected to a syringe that is made specially and connected to intravenous (IV) tubing and to an IV solution. In addition to this system, multiple pump systems have been developed to increase the velocity of the infiltration.

According to its proponents, the technique allows large amounts of fat to be aspirated without the need for transfusion.

Although local infiltration of the tissues before surgery is helpful, it has its problems such as spotty areas of infiltration and risk of overdosage of lidocaine in addition to blood loss, necessitating replacement and overdosage of fluid that could end up in pulmonary edema.

This technique can be used with success above 2500 cc of aspirate.

As described by Klein, the tumescent technique obviates these problems somewhat. It can reduce or eliminate the preoperative medications, general anesthesia or even IV fluids since in some cases the infiltration in itself is sufficient without the recourse to IV medications or IV fluids.

TABLE 2-6

Replacement of fluids during liposuction

Amount of fat and blood loss	Ringer's lactate blood
500 ml	1000–1500 ml
500–1000 ml	500–1000 ml
Dry	1000–-2000 ml
Bloody	Add 500 ml colloid
1000–1500 ml	1500–3000 ml
Dry	Add 1000 ml colloid
Bloody	2500–4000 ml
1500–2000 ml	
Dry	
Bloody	Add 1000–1500 colloid
2000–2500 ml	
Dry	2 x Volume of Loss
Bloody	1 unit autologous blood
2500–3000 ml	
Dry	2 x Volume of loss
Bloody	2 units autologous blood

Surgical Technique

Marking of the area is done as usually for liposuction. The upper and lower markings are made with solid markings and the areas of feathering with stippled markings. The areas of entry for liposuction are marked. Usually two entry points are necessary to perform the crisscrossing during liposuction. These same incision areas are used for the introduction of the tumescent needles and then later for the liposuction. The point of infiltration is itself infiltrated with xylocaine and epinephrine in order to reduce the pain of needle infiltration.

Then the tumescent infiltration **(Table 2-7)** is done until a tight turgor in skin surface is obtained. Attention is turned towards the actual liposuction cannula and an incision is made or enlarged at the original point of infiltration and the cannula is used through this entry for the liposuction.

TABLE 2-7

Tumescent anesthesia technique

Klein's formula
❖ Normal saline 1000 cc
❖ Lidocaine 50 cc, 1% plain
❖ Sodium bicarbonate, 10 cc of 8.4%
❖ Epinephrine 1 mg
Hunstad's formula
❖ Lactated Ringer's 1000 cc
❖ Lidocaine 50 cc 1%
❖ Epinephrine 1 cc (1:1000)
❖ Warmed to 38° centigrade
❖ Final concentration of both solutions is lidocaine 0.05% and epinephrine 1:1,000,000.

In short, the liposuction can be done usually using a diluted solution of lidocaine with a concentration of epinephrine and this solution is diluted more often three times, or ten times since the tumescent technique is used.

The most important characteristic of this technique has been the relative lack of blood loss. The findings have shown that the tumescent technique is able to provide enough local anesthesia and decrease the blood loss during the procedure. In addition to the solution used, some sodium bicarbonate can also be added to minimize the burning sensation obtained by the lidocaine infiltration. Warming of the solution has allowed less refrigeration of the body and helps in reducing the shivering, and oxygen demands of the patient.

This technique has been used in cases of ultrasound liposuction since the ultrasound works its best in a more fluid environment. A blood pump can be wrapped around the intravenous bag to create approximate pressure for the fluid injection.

Surprising facts that the tumescent technique is working have been noted, in particular, the upper limits recommendation of the lidocaine that can be injected have been completely shattered by the findings that a very large amount of xylocaine can be accommodated while the tumescent technique is being used. It is mostly due to the fact that after these large amounts of fluid containing the lidocaine have been injected, the release in the blood stream is extremely slow and never reaches the toxic levels that are known to occur when large amounts of xylocaine are injected. In the past, an average upper dose of 500 mg of 1% xylocaine was recommended. The study of the release of the xylocaine has found that there is an extremely slow release and larger doses can be used.

Intravenous solutions can be injected, however carefully, since pulmonary edema can result if excess fluid has been infiltrated. The urinary output can be observed as well as the blood pressure, the venous pressure, and other vital signs useful for estimation of the capacity of the vascular system and its potential overload. It is the anesthesiologist who carefully evaluates all these parameters in order to avoid difficulties during or after surgery.

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3 The Setup

Adrien E Aiache

ABSTRACT

The setup for performing liposuction includes an understanding of the machine, the cannula including its type and size, dressings and garments, technique of liposuction, preoperative and postoperative photography, and markings. There is a discussion of each of the above topics in this chapter.

The Machine

The simple and direct concept of extracting fat by its curettage was worked out by Schrudde since 1964.[1] Arpad and George Fischer[2] then used a motor-driven chopping curette with an original additional idea—suction of the fat.

Illouz simplified the technique by using suction alone, as he imagined the now proven wrong concept of liquefying and destroying the fat with a hypo-osmotic solution. Luckily, he was provided a strong suction machine (Medicalex) that remained the first and best instrument for an extended period of time **(Figure 3-1)**.

With the popularization of the technique, many companies sponsored by plastic surgeons developed their own suction machines and cannulas **(Figures 3-2 to 3-8).**

Heated discussions occurred during medical conventions concerning the "right technique, cannulas and machines". These instruments were varied although basically similar. This book will concern itself with cases performed with varied machines and using rounded cannulas of many styles. Each surgeon gets a slightly different exposure in his training and his preferences may be different too. He will have to make a partly original

FIGURE 3-1

The original Medicalex suction machine, a quiet and sturdy machine developing maximum negative pressure in a short time

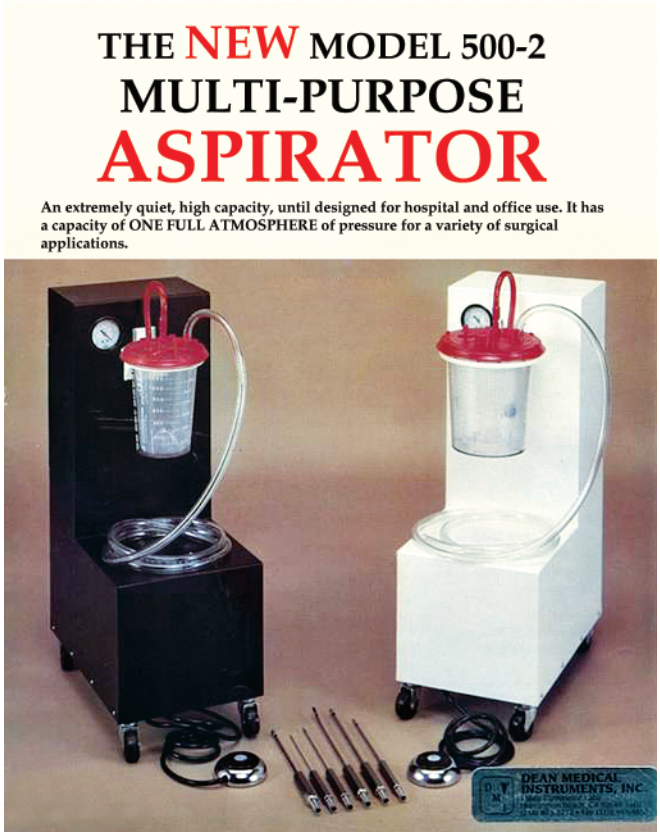
THE NEW MODEL 500-2
MULTI-PURPOSE
ASPIRATOR
An extremely quiet, high capacity, until designed for hospital and office use. It has a capacity of ONE FULL ATMOSPHERE of pressure for a variety of surgical applications.
DEAN MEDICAL INSTRUMENTS, INC.

FIGURE 3-2

The Dean suction machine with disposable canisters, excellent for office or hospital use. The added fumes filter is a requisite for any new machine (Dean Instruments, Carson, CA)

FIGURE 3-3

Dean cannulas with glass bottles with metallic sterilizable top allowing fat transplantation

decision as to which instruments and the machines he will use.

The basic components of the machine consist of a vacuum cleaner with an aspirating pump and a special container for the acceptance of the fat that has been

Grams
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design and production for the medical profession
GRAMS ASPIRATOR
Model # S-300
For plastic and general surgery
An exceptionally quiet, portable, deep vacuum aspirator
A totally enclosed, sound insulated housing with whisper quiet cooling fan permits the modular pump motor to operate continuously without overheating.
The two stage oil-type rotary pump will produce vapor pressure vacuum in about 15 seconds in the 2.5 liter trap jar. (Vapor pressure vacuum is defined as the maximum obtainable vacuum in the presence of body fluid in the operating room regardless of altitude or atmospheric conditions. 20°C at sea level, vpv =743mm Hg or 29.25".)
Operating room quality air is assured by a properly designed and easily maintained exhaust filter. Large casters provide smooth movement in and out of the operating room. The handle and trap jars are easily removed for compact portability.
SPECIFICATIONS
* Pump and motor, one piece light weight construction, easily removed with-tools. Weight: 21 lbs., 1/3 hp, v, AC, 7 amp., 3 ft3/m 25 microns.
* Small trap jar, 500 cc.
* Intake filter protects motor from particulate contamination. 25 micron filtration.
* Exhaust filter traps condensation and oil vapor. 25 micron filtration.
* Light weight, heavy wall, anodized aluminum housing, clam shell design, snap action closure. 14"H, 13"W, 18"L, 30" top of handle.
* Jar tops, one piece silicone rubber, tubing connection of stainless steel.
* Vacuum gauge, 30" mercury.
* Modular electrical panel; pneumatic operated foot pedal, curcuit breaker, pilot light, 3 position master switch, (on, center off, foot pedal).
* Special high clarity steam autoclav-able silicone vacuum hose.
* Weight: 49 lbs.
Aspirator: Model S-300 - Price, $1,950.00 - Plus $35.00 shipping, UPS regular.
Includes extra supplies: 1 large jar, 1 7' hose (3/8" ID), 2 filters, 1 bottle oil.

FIGURE 3-4

Grams aspirator, which is a very sturdy and reliable machine

FIGURE 3-5

The Sklarvac Multipurpose Suction Unit

MEDCO ASPIRATOR IV

a standard in the industry since 1987

THE MEDCO ASPIRATOR IV

A highly advanced aspirator for surgical procedures has been...the **MEDCO Aspirator IV.**

The **MEDCO Aspirator IV** utilizes two advanced, state-of-the-art positive displacement pumps. MEDCO Aspirator IVs are further advanced in that the pumps are dual headed. The dual headed pumps relieve back pressure to allow each individual pump to pull against the patient so that a deep vacuum is quickly reached and maintained. If one pump should go down, the other three will continue to function independently. This is significant when you consider that competitive aspirators require one of their pumps to be connected to the exhaust of the other pump to relieve back pressure so that they can reach high vacuum.

The positive displacement pumps used in **MEDCO Aspirators** are the quietest on the market. The aspirator is made even quieter because we have mounted the pumps with 1" shock mounts to virtually eliminate vibration. When combined with a quiet muffler system and insulation system, you have the quietest aspirator on the market today.

MEDCO Aspirators are competitively priced, and come with a limited five year warranty on all parts and labor.

Voltage	110 or 220 V
Weight	64 pounds
Dimensions	17"x18"x18"
Max Vacuum	29+ inches Hg
Max Flow	7.5+ CFM
Sound level	39 ± 3db
Pump	2 x 2 piston
Horsepower	2/3 hp
MAINTENANCE FREE, OIL LESS	

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(281) 379-3100
TOLL FREE
1-800-953-2555
Fax: 1-281-251-7608

FIGURE 3-6
The Medco Aspirator

FIGURE 3-7
Tubing for Medco

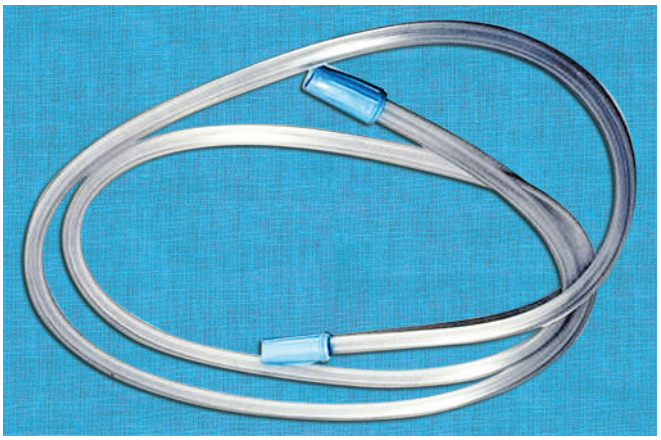


FIGURE 3-8
The Davol tubing is disposable and light enough to allow fine liposuctioning in areas such as the face or the knees. It is inexpensive

aspirated. This concept lies in the fact that a vacuum can be created down to zero and there are no machines that can deliver a better figure. Thus, even the syringe technique can achieve the same level of vacuum and this concept has helped the development of the technique of syringe liposuction.

The Cannula

A cannula is a long metallic tube with an opening at its end. The size of the cannula, its length, the position of its opening, and the sharpness of the edges of the opening are varied and have been the subject of many discussions **(Figure 3-3)**.

Criteria for Proper Cannula Selection

A proper cannula should have blunt edges at the opening; the opening distance from the tip should be 1 cm or more if one wants to avoid a too superficial liposuction. If the openings are close to the end, one should be careful of not reaching a spot too close to the skin surface.

Proper size handle: this depends on the size of the hand of the surgeon and companies provide different sized instruments.

Round smaller tips to allow nontraumatic, non-cutting perforations of the fatty tissue and preservation of the denser anatomical deeper elements. This concept can be proven wrong sometimes when a Robles cannula is used and it shows that it does not injure any of these structures.

Modifications are made constantly and some interesting features have been added to the already available variety of shapes such as the flat cannulas, the curved cannulas, the multiple-holed cannulas and the different size and shape of the openings.

Cannula Sizes

Originally, a #10 cannula (10 mm) was used for large hips, saddlebags and abdomen; #8 for saddlebags, abdomen, thigh, flank and iliac crests; and #6 for neck, breast, abdomen, epigastrium, knee, thighs and for feathering the areas mentioned above. As time went on, it was discovered that the larger cannulas were taking out large chunks of fat with the potential complications of leaving dents and deformities. Lately, the most common cannulas used are #4 and #3. These numbers represent the inside diameter of the cannula **(Figures 3-9 to 3-13)**.

The thicker the cannula, the harder it is to penetrate the fat layers and the tissues, and to utilize the to-and-through movements since strong suction is holding back on the cannula. The new, smaller cannula makes this

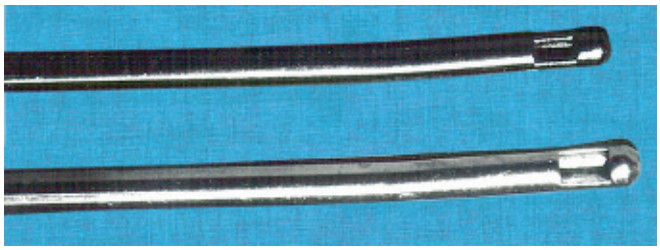


FIGURE 3-9
4 mm and 3 mm suction cannulas. Note the blunted tips and the size of the openings

FIGURE 3-10
An assortment of diverse cannula used for suction

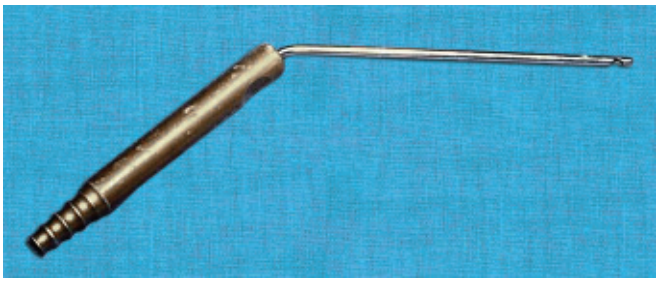
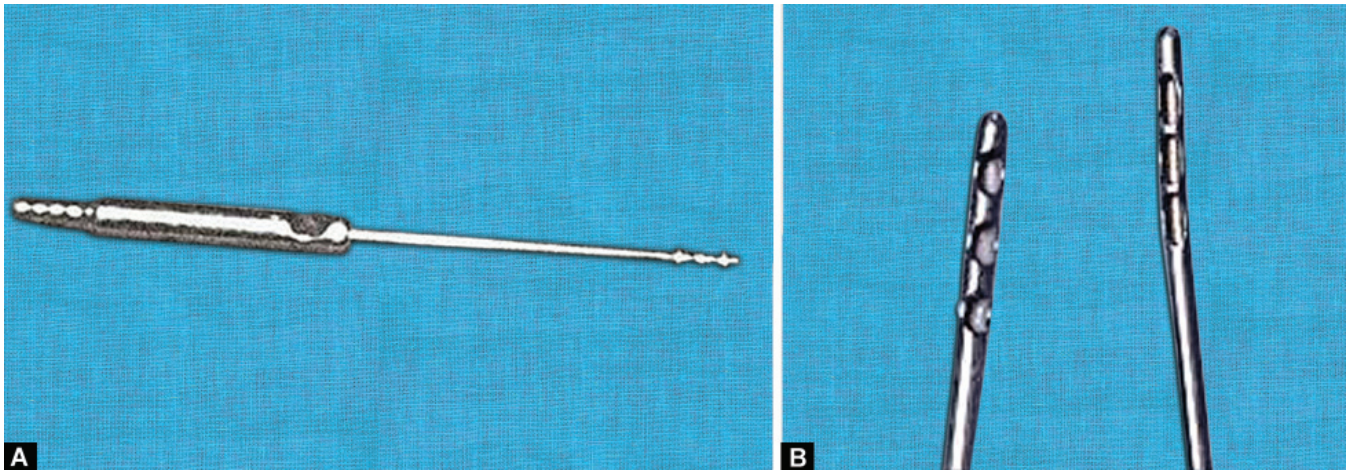


FIGURE 3-11
The #4 angled Aiache cannula useful for chin liposuction with its 30 degree angle facilitating positioning of the surgeon



FIGURES 3-12A AND B
(A) Small caliber cannulas such as this 4 mm cannula can have a great power of aspiration enhanced by the presence of multiple openings; (B) The 3-holed cannula was originally developed by Fournier

FIGURE 3-13
Example of multiple cannulas developed by a company for the different aspects of liposuction

problem less difficult and the power cannulas activated with a back-and-forth movement have been even more useful in alleviating the fatigue of the surgeon.

Much has been written about holding the opening of the cannula down, however, it is only important in realizing the exact level of suction because in most areas (except for the neck and the malleoli), it is necessary to preserve a layer of fat and to avoid penetrating the superficial fat layers, thus avoiding depressions.

Introduction of the Cannula

The incision should be deep to allow the cannula tip to go through the superficial fascia and to stay below it. When the tip hits the muscle fascia the cannula is angulated almost parallel to the skin **(Figure 3-14)**.

Once the cannula is at the right tip level, the suction is started carefully, avoiding suctioning near the incision for fear of creating a dimple in the area. The suction tunnels are done methodically in using the palm of the opposite hand which is flattened against the skin in order to feel the exact thickness of the fat layers. In cases where the liposuction is not possible at the right level, grasping the skin between the fingers and around the cannula will allow more controlled suction.

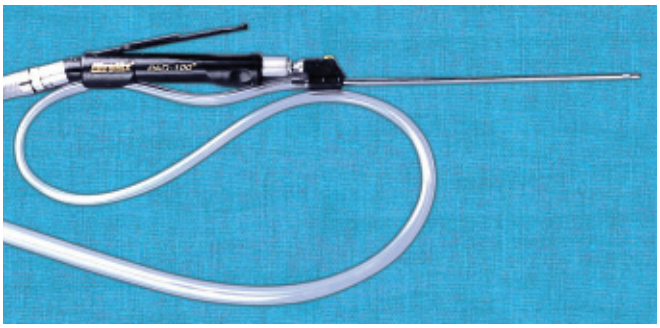


FIGURE 3-14
The cannula is introduced down to the deep fascia going through the superficial fascia system

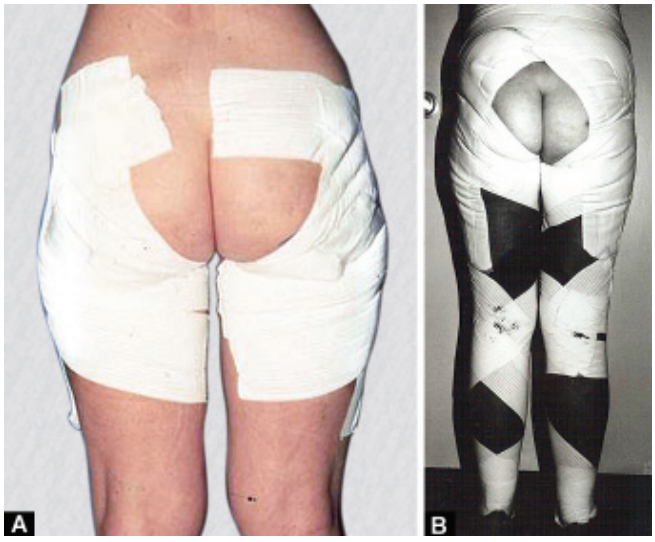
Dressings and Garments

After the process of liposuction, a vacant space is left under the skin. This space is created by the aspiration of fat leaving only the nerves, vessels and lymphatics, which come through the muscle and go towards the skin surface. The existence of these connections has been shown on videotape as well as on actual operative sites when an open incision is made in an area which has been suctioned. The space which is left behind does not actually consist of tunnels or bee wax, it actually consists of an empty space which is traversed only by the nerves and vessels, and some connective ligaments.

It is easy to understand why following liposuction some type of compression should be applied in order to allow healing of the two new surfaces. This compression is best accomplished by using either an elastic bandage or using a garment. Originally, elastic tape alone was used, however, the elastic garments played the same role, and prevented the inconveniences and complications caused by elastic tape such as tape burns, allergies and pain on removal.

Technique

The elastic bandages should actually be applied with the idea in mind that the vascular returns should not be interrupted **(Figures 3-15A and B)**. After the operative site has been properly closed and the incisions covered with some type of dressings, the skin is washed and the garment is then put on immediately after the surgery. Excessive tape is dangerous circumferentially, especially in the area of the knees since it could cause deep vein thrombosis.



FIGURES 3-15A AND B

(A) Typical application of the elastic tape after suction of the hips and thighs. A garment is easier to use; (B) Elastic tape applied after saddlebag, iliac crest, inner thighs, knees and ankle liposuction

The garments are usually made of an elastic material which allows good compression in the area that has been operated on. They should fit relatively snugly and in some cases they require special custom-made pieces. They are commercially available for different areas, including the neck, the breasts, the arms, the hips, the thighs, the ankles, etc. **(Figures 3-16A and B).**

Preoperative and Postoperative Documentations Photography

Photographs of patients showing different views are necessary for proper evaluation. They should be taken equally with markings in order to have a document of the surgery. Photographs represent the most important tool in preoperative and postoperative documentation of the work accomplished. In the preoperative pictures, the areas of suction are marked with ink for referral during surgery and for evaluation. Markings can indicate the thickest areas, the thinnest areas and the areas of feathering.

FIGURES 3-16A AND B

(A) Garments used after liposuction of the face, knees and arms; (B) Garments used after liposuction of the abdomen, iliac crests, waist, saddlebags and inner thighs. The full body girdle depicted on the right is the most commonly used since, in addition to its compression, it will help in prevention of deep venous thrombosis

Markings

Added shortly before surgery, the markings are of the utmost importance. Any type of indelible ink can be used. Markings are better made with the patients upright and they are made with the following two goals in mind **(Figures 3-17A and B):**

- Circumscribing the area to be defatted. The markings can be doubled. The inner circumferential line indicates the exact area of demarcation between the suctioned and unsuctioned area. A second outer marking will then indicate an area of feathering, which is necessary to obtain a proper draping of the skin around the suctioned-out area, preventing a step-down effect at the junction of the two zones of the skin. Feathering is usually done by the to-and-through movement of the cannula with mild suction applied to the tubing.
- The second purpose of the markings is to indicate the areas needing most of the treatment as well as the areas needing little or no treatment. Careful appraisal of the area to be suctioned-out is done at the time of the markings. Rotation of the patient and the pinch test will help determine the extent of the problem and the particular area of correction. Rotation allows tangential view of the area to be used over the full extent of the extremity. For example, in checking the circumferential surface of the outer thighs, the tangential view will be useful.

FIGURES 3-17A AND B

(A) Different incisions that can be used on the anteriorly. These incision markings should be made carefully and symmetrically to obtain similar symmetrical results; (B) Posterior incisions. These incisions are used for liposuction in any area of the body

The markings, being the result of physical examination, should not be modified on the operating table since that would create a problem after the skin has shifted to a different position. An example is jowl suction that could leave a depression in the mandible if not properly located since the jowls gravitate down in the standing position.

The markings will appear on photographs and help the postoperative understanding of the results. From the scientific and medical aspect, the importance of documentation is paramount. The surgeon should make an effort to learn proper techniques and to obtain satisfactory illustrations of his work.

Photographs Required

Face

- Anteroposterior
- Lateral right
- Lateral left
- Oblique right
- Oblique left
- Framing should go down to the clavicles.

Abdomen

- Anterior or anteroposterior standing
- Lateral right
- Lateral left
- Sitting oblique
- Standing oblique
- Framing from the clavicles to the knees.

Saddlebags/Thighs

- Anteroposterior
- Posterior view
- Oblique posterior right
- Oblique posterior left
- Lateral right
- Lateral left
- Framing from the clavicles to the knees.

Iliac Crests

- Anteroposterior
- Posterior view
- Anterior oblique

- Posterior oblique
- Lateral right
- Lateral left
- Framing from the clavicles to the knees.

Thighs

- Anteroposterior
- Posteroanterior
- (Legs are slightly open)
- Lateral right
- Lateral left
- Lateral with one foot elevated
- Framing from the nipples to the ankles.

Knees

- Anteroposterior
- Posteroanterior
- Lateral right
- Lateral left
- Framing from the hips to the toes.

Ankles

- Anteroposterior
- Posteroanterior
- Both lateral with distant foot in front
- Posteroanterior while the patient is climbing on his/her toes
- (Patient should be on an elevated stool)
- Framing from the stool up to the crotch.

Areas of Surgery and Special Positioning

Face and Neck

In these cases the supine position is most adequate. Although in particular cases where the area present on top and immediately behind the sternocleidomastoid muscles has to be suctioned, the prone position can be useful.

Arms

The supine position is adequate. Posterior epitrochlear markings combined with midarm incisions allow full suctioning of the arms. The arms are held-up during the procedure. Another position which is adequate is the prone position in which the arm suction is performed in conjunction with other posterior procedures. In these cases, a combination of epitrochlear incision and axillary incision can comfortably be used.

Breasts

The supine position is most adequate in these cases. In particular cases, where the axilla and the chest area is suctioned, the lateral decubitus position is very useful allowing through an incision in the axilla and in the outer posterior inferior mammary fold to perform the suction on the fatty deposits.

Abdomen

The supine position is adequate for most cases of the abdominal liposuction. In cases of waist suction lipectomy, it may be of some help to either situp the patient during the estimate of the removal and the lateral decubitus position can also be useful when an important reduction is necessary in the waist zone. Although the markings are made standing taking into consideration the ptosis of the abdominal wall, one may often see an unsightly result from an improper defattening of this area. It has been found that in many of these cases, the lateral aspect of the abdomen should be suctioned in order to allow the anterior zone situated over the rectus muscle to look more anatomical.

Iliac Crests

The surgery is started with the patient lying prone. The markings have been made upright and are followed faithfully. At the completion of the procedure the patient is allowed to stand or kneel and the procedure is continued in that position.

Once positioned, the patient is allowed to rest her chest on the table during suction episodes. Re-estimation is made with the patient erect. This process is continued and repeated until a proper result and the desired contour of the area is obtained. Checking the contour by multiple angles, estimate and palpation, the surgeon works until a smooth contour is obtained from all angles.

Saddlebags

After proper markings and after administration of local anesthesia, the usual two or three incisions are performed, and liposuction is performed in a crisscross fashion bilaterally. At the completion of this procedure, the patient is placed erect. Of the two positions that are available; the standing position will be obtained by standing-up the patient on the floor at the side of the table allowing the patient to rest her chest on the raised table. Successive changes of position in the torso will allow frequent checking of the shape of the thighs. When or if the patient becomes dizzy, she is allowed to lie on the table.

It is obvious that the flattening of the thighs under the pressure of its own weight could have precluded such an exact estimate of results. A tangential look is afforded from all angles around the thigh when the patient is erect. In particular, one will often find that a more anterior extraction will be necessary. Without the opportunity to stand the patient up, this course of action is not possible.

One of the interesting suggestions by Giorgio Fischer[3] is the orthostatic table in order to evaluate exactly the amount of fat removed during liposuction and "finesse" the results. While the patient is lying down, the gravity will disrupt the shape of the thighs, the skin, the fat and the muscle and this orthostatic table is devised for that purpose. The author has used the kneeling position **(Figure 3-18)** and even the standing position, either on the knees or on the feet, to provide proper sculpturing of the fat.

FIGURE 3-18

The patient is in the kneeling position and awake. Liposuction and shaping of the thighs becomes more precise since it shows the exact contour of the thigh without the distortion caused by the prone or supine position

Inner Thighs and Knees

The prone position is used in the early stages of the surgery. The patient is often turned sideways with the legs spread allowing comfortable aspiration in the upper part of the thighs and the knees.

Further aspiration of the area is done with the patient kneeling. Often it is found that an anterior extension of the suction will help in contouring the thigh.

Two incisions are often necessary in the thighs. The infragluteal thigh for the posterior approach of the thigh and knee, and the anterior groin approach for the anterior thigh area. In addition, the frog-leg position is used for the exact removal of the inner and anterior thigh fat that is difficult to evaluate without this special position.

Ankles

The prone position will often suffice since the leg is bent and allows circumferential view of its contour.

A different level of approach to patient positioning is advocated for better esthetic results in suction. Although this particular approach will create a more difficult situation from the sterilization point of view, it has, nevertheless, been a useful tool in obtaining superior results.

General Liposuction Surgical Technique

General liposuction surgical technique is given in **Table 3-1.**

The technique consists of the following: an incision is made down to the subcutaneous tissue and fat. It measures approximately the same length as the caliber of the cannula to be used. The incision should go deep and straight in order to avoid the multiple superficial layers and allow the cannula to reach the muscle fascia.

TABLE 3-1

Proper technique to avoid complications

❖ Stay deep (This dictum is not necessary any more since the advent of superficial liposuction)
❖ Do not remove too much
– 2 cm in forgiving areas, 4 cm in non-forgiving areas
❖ Cannula holes down
❖ No lateral movements
❖ Proper instruments
❖ Holes 2 cm from the tip which is a blunt tip
❖ Crisscross technique

Technique

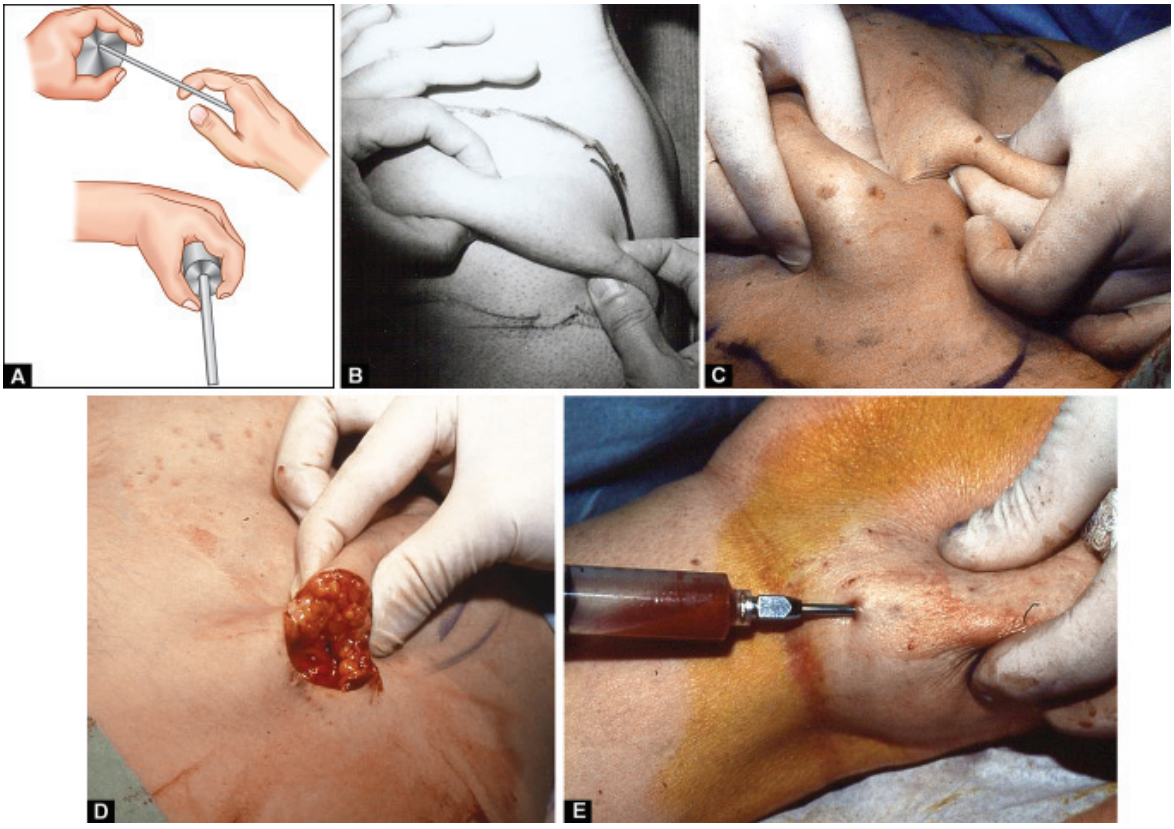
A cannula of the proper size is introduced perpendicular to the skin through the incision and goes down to the deep layers over the muscular fascia. Then the cannula is pushed again parallel to the muscular fascia, and by a sawing movement multiple back and forth movements are made while the liposuction is turned on. Approximately, 15–20

strokes are made in the tunnel that is created in that fashion. The cannula then goes to a parallel neighboring area and the same technique is repeated in a slightly oblique fashion and the area is liposuctioned in a spoke-like fashion covering the zone that has been demarcated by the markings. Each tunnel is made in the same fashion until it is felt that they have covered the whole area. The most important part of the technique is to use a second incision in an opposite zone in order to be allowed to crisscross the zone to be liposuctioned by creating tunnels in a perpendicular fashion to the previous ones.

Although the original concept developed by Illouz and his coworkers was to make parallel diverging tunnels, keep in mind that the work to be accomplished consists of complete emptying of the fat layers contained between the skin and the deep fascia layer over the muscle. The only way to preserve some layers of thickness under the skin is to stay relatively deep. Depending on the size of the cannula, the depth of the tunnel will result in a thicker layer of subcutaneous fat. The tunnels are made in a very methodical manner for fear of missing or skipping an area and with the aim of obtaining a very even surface. To that effect, the second crisscrossing incision is helpful. One has to remember that, if the zone that has been suctioned was elevated as a flap, there would be actually no specific tunnels but a completely emptied area with only multiple strands of connective tissue, nerves and vessels connecting the deeper muscular layer to the subcutaneous area.

Estimate of Removal

During the procedure a constant inspection by palpation of the skin, both by flat palpation and by rolling of skin folds, is performed to assess the level of thinning. A combination of pinching and rolling the pinch along the area worked on will be useful. If an area is found to be too thick, it can be grasped as a sausage between the palm and the fingers, and the cannula is introduced and directed between the fingers to thoroughly defat the area **(Figures 3-19A to E).**



FIGURES 3-19A TO E

(A) The grasping left hand is clutching the tissues while the right hand holds the cannula and pierces the fat layer. This technique is useful in obtaining an even liposuction result; (B) Use of the pinch test to determine the fat thickness. The two pinches show the difference between a liposuctioned area and a non-liposuctioned area on the left; (C) Palpation of the fat thickness between two fingers is useful throughout the procedure to assess the amount of fat that still needs removal. A combination of rolling and pinching is used over the surface to be liposuctioned; (D) The pinch shows the fat doubling when it is pulled-up, showing the exact thickness of the fat layers opposed by the fingers; (E) Pinch and aspiration

Once the area has been satisfactorily defatted with continuous palpation and pinching, the finessing process is done, using a finer cannula, to defat the zone out of the zone to be suctioned. In addition, the feathering technique consists of suctioning the periphery of the area with a finer cannula and to use the cannula to free the tissues without suction.

Extent of Liposuction

The liposuction is used throughout the area which has been marked for defatting. It is only extended slightly at the periphery by feathering for a smooth transition. Constant refinements using smaller cannulas is useful, however, this should be done carefully in order to avoid uneven areas.

Advantages of the Crisscross Technique

The entire suction lipectomy procedure was once based on the single approach especially for saddlebags. It soon became apparent that it was causing postoperative cosmetic problems. Indentations and depressions in the outer edges of the treated area could be mainly blamed on this approach from only one area. The horizontal versus vertical approach became an issue and the crisscross technique became more popular.

The care of the suction is the ultimate root to success. A watchful eye in all tangential areas and a constant palpation and pinching of the tissues which are suctioned will help in determining the evenness of the procedure. The final touches should be performed with finer cannulas. The author favors the Robles cannula which has a sharp beveled tip and is useful in electively suctioning zones that could be easily missed with other types of cannulas.

Although in the past it was suggested to stop the movement of to-and-through with suction when blood was appearing, it is obvious nowadays that a bloody suction should not in itself be a reason for stopping the suction although it becomes more difficult and more dangerous if the amount of blood is larger than usual. This is the reason why the superwet and the tumescent techniques are so useful for proper liposuction.

Technical Hints (Table 3-2) (Figures 3-20 to 3-25)

- Penetrate deep and stay deep, riding the cannula over muscular fascia **(Figure 3-30 to 3-34)**.

TABLE 3-2

Intraoperative controls

Tests:
• Pinch
• Rolling pinch
• Compression test
• Amount of fat to be aspirated
– Tests of quality
– Pinch (1 cm)
– Blood in tubing appearance test
• Appearance Tests:
– Appearance test
– Tests of regularity (comparison and rolling pinch test)
– Test of quality
- Check if there is dimpling tumors or masses
- Compression test which magnifies the defect
– Tests of improvement
- Appearance
- Amount in the bottle
- Pinch of the same size on both sides
– Prognostic tests

FIGURES 3-20A AND B

(A) The exact extent of the suction process is depicted by the bruising of the tissues. This type of photograph should be used as an illustration for patients requesting explanations. The bruising will last approximately three weeks; (B) Lateral view of the same patient showing the exact extent of the suction

- If one is to perform superficial liposuction, the zone of suctioning should become more and more superficial with thinner cannulas to obtain an even result.
- Diverging tunnels are made close to each other in order to remove the fatty layers without "missed areas" **(Figures 3-26A to C)**.

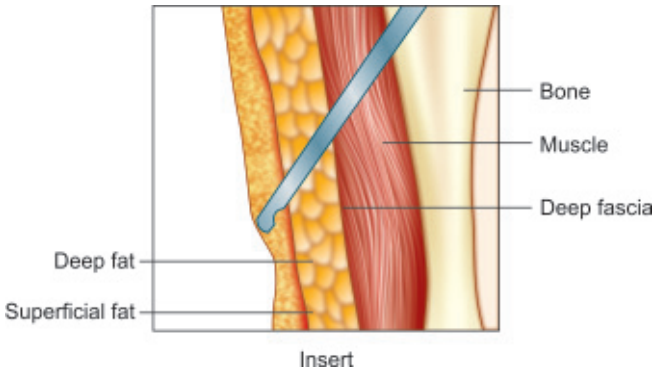


FIGURE 3-21

The superficial fascia of the hip and saddlebags area shown below the skin. This layer should not be entered by the cannula to prevent dents and depressions. It is entered only when superficial liposuction is contemplated

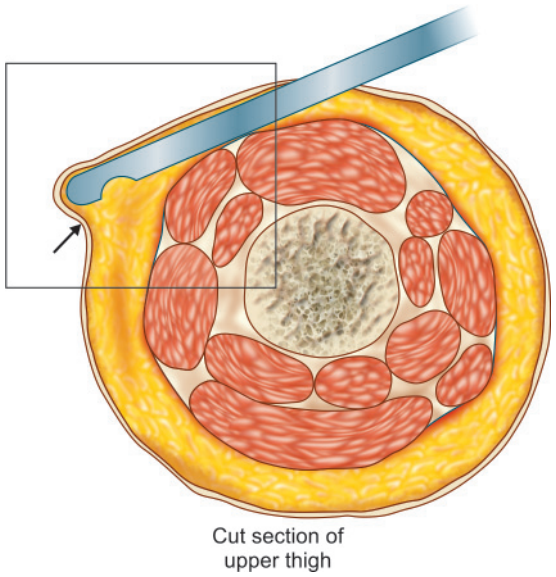


FIGURE 3-22

The most probable cause for dents and depressions is the tenting-up of the skin by the cannula which transforms an inferior cannula opening into a superior opening

- Use the left hand to flatten the tissue during suction and use the flat of the palm to ensure a uniform thickness under the skin.
- Use the left hand to grab areas in order to defat them more thoroughly when they have been felt to be too thick. The cannula is introduced between the grasping fingers during suction.
- Use the crisscross technique for thorough defattening.
- Flatten the edges and be careful at the periphery of each area by feathering and liposuctioning less fat.

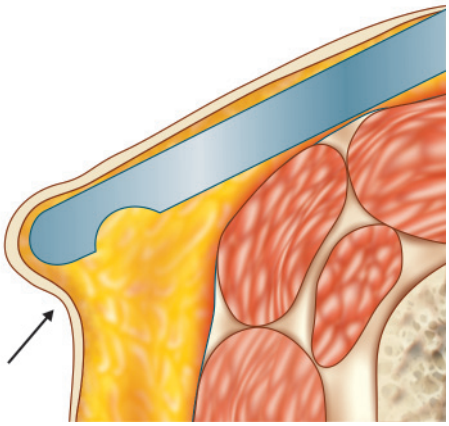


FIGURE 3-23

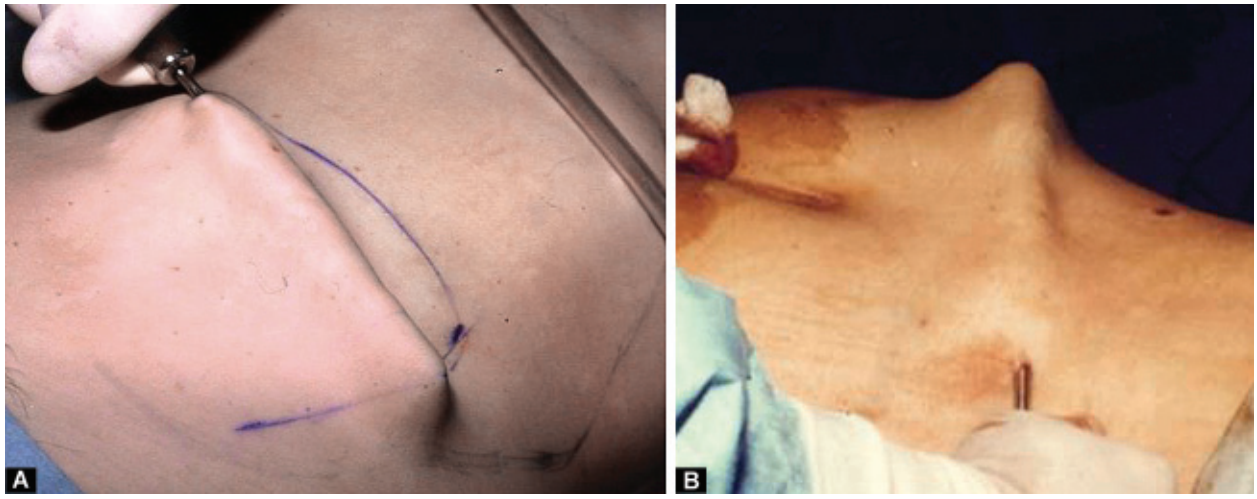
Process showing the liposuction combined with the penetrating action of the cannula resulting in superficial fat removal and skin depressions unless the surgeon decides to perform superficial liposuction

FIGURE 3-24

When one desires extreme thinning, the technique of liposuctioning between the pinch will help in accomplishing that goal. The superficial liposuction affected here is often used for neck, knees and ankle liposuction and sometimes for saddlebags as described by Gasparotti

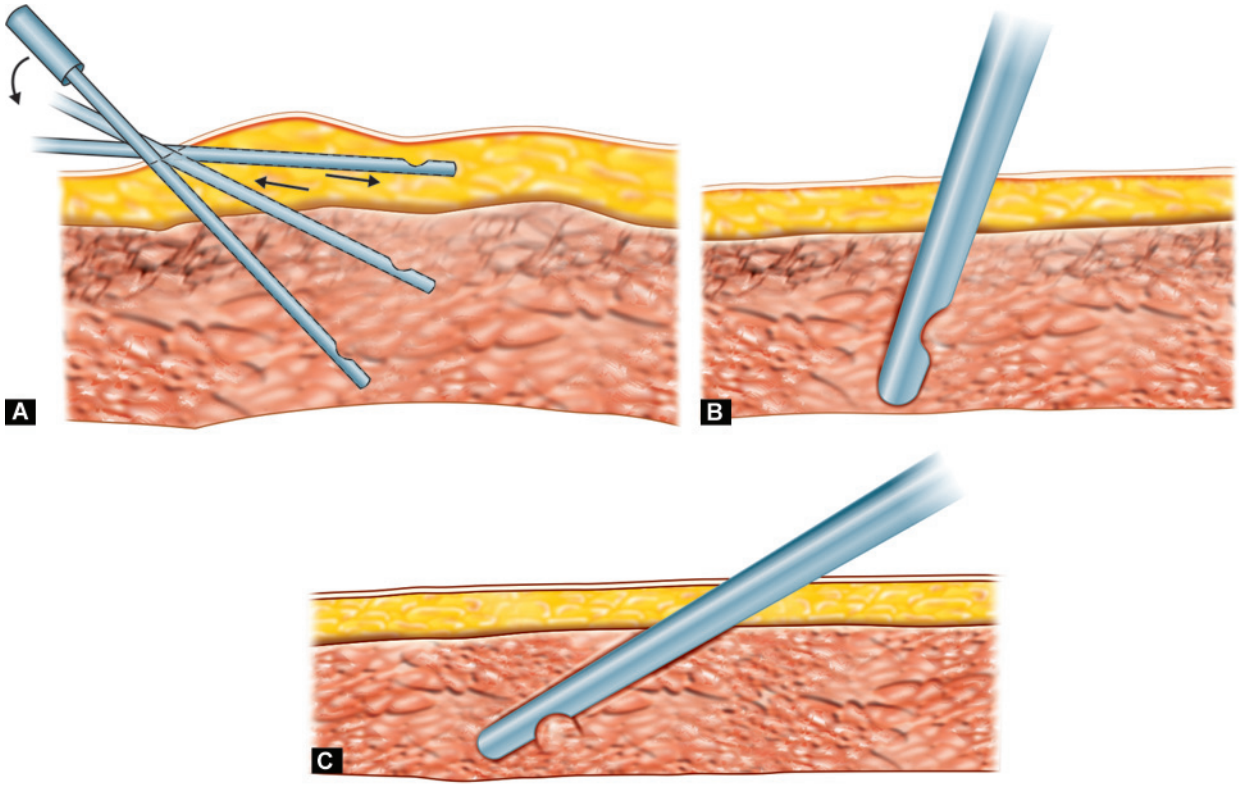
Cellulite

The so-called cellulite is a skin condition which was originally described by the French. Although it took some time for this concept to be understood in this country, it is at this time rather well-conceived and its treatment is requested by many patients. A simple look at the advertisements in magazines indicates the concerns of the female about this special condition.



FIGURES 3-25A AND B

(A) In abdominal suction, safe technique consists of elevating the tip of the cannula at all times in order to prevent an accidental fascia penetration with abdominal organ injuries; (B) This is a great way to judge the fat thickness by observing its thickness over the elevated cannula



FIGURES 3-26A TO C

Cut section showing the levels of depth in liposuction technique. The superficial liposuction is used to thin-out the subcutaneous fat level as opposed to the deeper liposuction going under the superficial fascia system and liposuctioning the deep fat deposits only

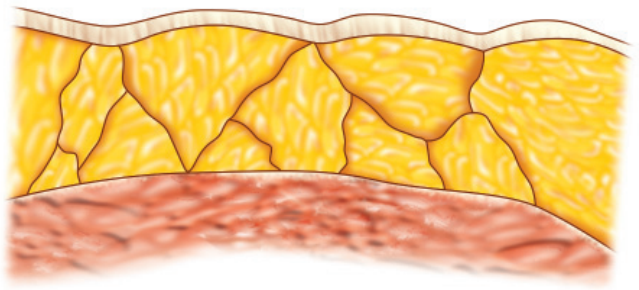


FIGURE 3-27: CELLULITE

Superficial fat with appearance of "peau d'orange", a mattress-like skin surface. This was originally described Nürnberger and Müller (1978).[4] Under the microscopic the subdermis shows some chambers of fat separated by septa (retinacular cutis) in arches and raised and holding the subepidermis chorion down to the superficial fascia below

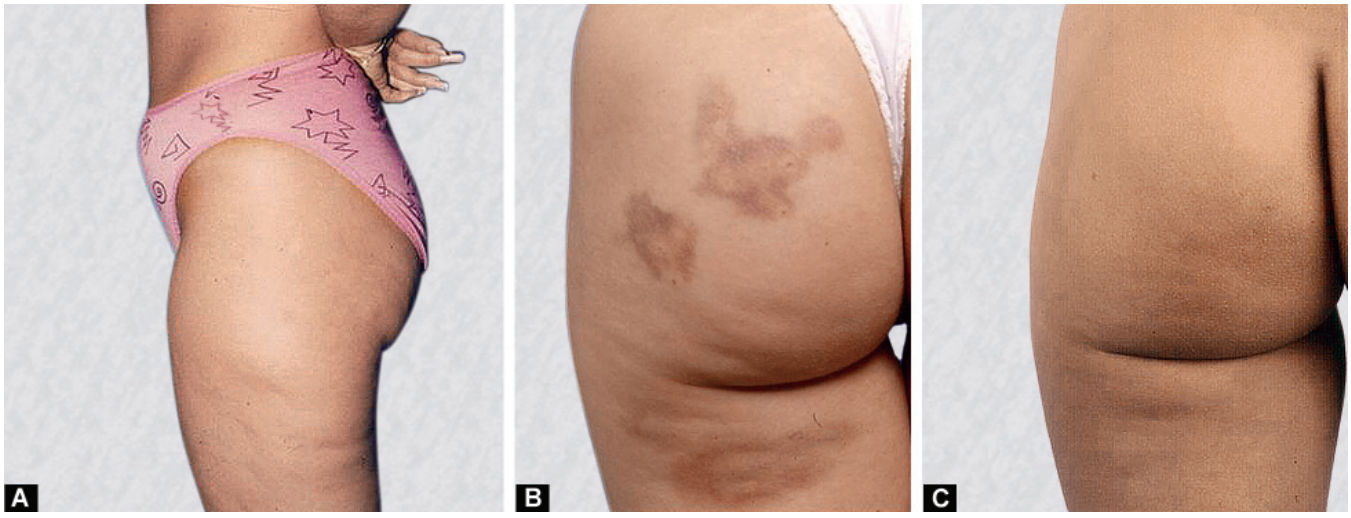
The cellulite from a medical standpoint does not respond to its definition. Cellulite in French indicates an irregular, bumpy skin surface with depressions, however, in English cellulitis means an infection of the area of the skin, so this definition does not apply really to the condition described **(Figures 3-27 and 3-28)**.

The condition consists of a bumpy skin surface interspersed with areas of depression. This appearance is difficult to understand, however, it could be related to the appearance of a mattress with the multiple buttons that are holding the mattress at different regular spaces. On the patient, the area is tender to palpation and especially to pinch. It seems to be a more sensitive skin than the ordinary skin probably due to the congested, tense, fat deposits in these areas. Cellulite, however, does not regress with weight loss and is apparent in the hips, the thighs and the buttock, especially, although it could be present in many other areas.

For the longest time there was a paucity of medical treatments and this has allowed all the paramedical treatments to come into play. All types of claims are made by many companies and all types of treatments are advised such as massages, special diets, special baths, oils, exercises, and so on. In reality, very little can be done medically to improve this condition. The demographic distribution is limited mainly to females and it is rare in males. It appears from 15 years of age on.

Lately a new concept has emerged representing, actually, two types of cellulite—the young-age cellulite and the old-age cellulite. Young-age cellulite consists of this particular appearance that has been described above.

Old-age cellulite consists mainly of a relaxation of the skin in many areas ending in a wavy, rippled type of skin appearance most likely due to the skin relaxation over tight fascial bands. From a scientific point of view, cellulite of young age can be described as the hypertrophic fat cells that have overgrown their boundaries and are pulling under the skin, thus imposing some tension on the many ligaments that attach the skin to the deeper fascia. The concept of superficial fascial system (SFS) shows that the skin is actually holding to the body underneath by a collagen network representing a large sheath all around the muscles sending rope-like attachments to the skin and holding it in its position preventing it from sliding away from the muscles underneath. This superficial fascia



FIGURES 3-28A TO C

(A) A 29-year-old woman with cellulite, more noticeable after suction lipectomy, and marked for surgical repair, using fibrous septa cutting and liposuction-filling; (B) Postsurgical; (C) Three months after cellulite release with some improvement. Further surgery is indicated for completion of the procedure

system divides the fat into two areas, one situated above it and just under the skin. The second one below it is especially large in certain areas such as the saddlebags, the buttocks, the inner thighs, the abdomen and the back of the arms. This concept of deep and superficial fat makes us understand why cellulite has not been amenable to treatment in the past.

Liposuction has allowed the reduction of the fat layers under the superficial fascia, however, it is a difficult treatment above the fascia since it can result in unwanted depressions giving the same appearance as the cellulite appearance. After the original work of Zaki Ftaiha in 1988, the treatment of cellulite has evolved gradually showing that it can be performed using a sharp square-end cannula allowing the actual freeing of the skin by cutting the ligaments attaching it below.

The author has added the additional technique of injecting some fat in the same zones that have been liberated in order to prevent a too quick reattachment of the skin below and to allow some limited mattressing, thus, preventing the full recurrence of the deformity. This type of cutting and injection of fat just beneath the skin surface can be adapted to treatment of inadvertent superficial suction done during surgery ending up in depressed areas.

Although it is understood that a large portion of the injected fat will actually disappear since it depends on a new circulation, it has been found, however, that some of this fat will actually remain and will help in the treatment of the so-called cellulite condition.

Superficial Aponeurotic Fascial System

The superficial aponeurotic fascial system has been described in the literature and in most anatomy books. Its knowledge was useful only in cases of abdominal surgery and in general principles of skin closure. After more extensive studies by Lockwood, its importance is now recognized and applications of its recognition are more numerous.

Description

The interest in the SFS is related to its importance in providing support to the skin and its subcutaneous fat—especially in surgical repair of the skin and in the movements as it allows some limited gliding of the skin over the muscles below it.

The characteristic of the SFS is its adherence in some areas, such as, groin, axillas, gluteal folds, inframammary folds, nasolabial area, which limits the anatomical areas and consequently allows the relaxing of skin between these "fixed points" when the patients are the victim of obesity or aging.

This relaxation of skin can consequently only be corrected by excisions within these areas between the fixed points (abdomen lipectomies, mammoplasties, trochanteric lipectomies and so on).

Fat Layers and the Superficial Fascial System

The understanding of the anatomy of the subcutaneous fat shows that there are two layers of fat in zones, such as, the hips, the abdomen, the posterior aspect of the arm and that in some areas the two layers are fused, since the "deep fat" does not exist in these locations (knees, ankles, chest and forearms).

These two layers can be hypertrophied and it is the understanding of the relationship that will help to avoid irregularities, dimples and "streaks" seen when the fat is removed too superficially. The SFS in some parts of the body (saddlebags, abdomen) covers a deeper fat layer. The suction process is directed under it preserving the superficial fat layer that is cosmetically more acceptable (saddlebags). In some areas thinning out is done over it, between it and the skin, since there is no fat layer below this superficial fascia (ankles, neck arms). The surgical judgment in suction is more of an esthetic judgment than a scientific one and sometimes when superficial suction is performed, the fat situated above the SFS is then removed.

Superficial Liposuction

In primary or secondary cases when an excess of skin is present and exhibits a cascading surface the technique of superficial liposuction using small cannulas (3 mm and 2.6 mm Robles cannulas) will allow the skin to retract properly.

Two different processes are available. One process consists of utilizing an all-level liposuction allowing skin retraction. Another process consists of limiting the suction to the superficial layer, ending up with the same skin retraction eventually. The incision is similar to liposuction incisions (infragluteal and hip). The patient is positioned laterally since this facilitates the visualization of the results of surgery.

Pushing the buttock down helps in determining the amount of saddlebag remaining and its eventual correction, which is usually difficult in the prone position.

Superficial liposuction is effected until the skin can be grasped and elevated from the tissues below it, however, the technique should not cut all the strands of the skin

in a cellulite release maneuver, that is dangerous creating large pockets, but the process should only extract the fat cells and leave the connective strands intact.

After the work of Gasparotti, the superficial suction technique has become popular since it is helpful in obtaining better results.

The technique allows improvement of flaccid areas in older patients, and obtaining a thinner and firmer looking cutaneous surface. The process is based on the belief that skin is endowed with a significant degree of retractile possibilities; the technique reaches the fatty layer situated immediately under the skin thus reducing the effect of gravity. This surgery is performed using fine cannulas between 2 mm and 3 mm and attempting a very thorough and very even suction.

Indications

Patients who present skin irregularities, either post-suction lipectomy or due to old age as well as young age cellulite, are candidates. Cases of fat lipodystrophy wherever present are good indications for superficial suction. In old patients with flabby, redundant skin, deep liposuction would only accentuate the superficial defects presented here. This skin problem is sometimes called old-age cellulite. The patients who have depressions and bumps as well as older patients with flabby, relaxed skin are thus good candidates. Other cases consist of the poor result after liposuction with skin irregularities, depressions and unevenness. A last indication consists of the young age cellulite which is the appearance of a "peau d'orange" secondary to the retaining ligaments of the retinacular cutis attached to the superficial fascia system below the skin.

Caveats

Although superficial suction is especially devised for irregular and bumpy skin surfaces, it is not, however, always possible to obtain a smooth, regular skin.

Markings

The areas of suction are marked in the usual fashion.

Positioning

Some surgeons prefer the lateral decubitus position in order to appreciate the degree of improvements obtained. A 4 mm incision is made in the ordinary fashion in the hip and in the subgluteal folds. The superficial suction follows a 4 mm cannula liposuction by the use of a 2.6 or 3 mm cannula in the more superficial layers. This is thoroughly connected with all the abnormal areas which are still containing some residual fat.

Technique

After local infiltration of a tumescent solution, the superficial liposuction follows the normal liposuction performed in the area which is the subject of the surgery.

The technique is similar to the suction lipectomy technique, however, the instruments consist of small diameter cannulas. The area is defatted thoroughly with a watchful eye and multiple periods of skin pinching in order to ascertain the exact thinning of the skin.

In cases of old-age cellulite, the additional technique of cutting the connections that attach the skin to the deep surface is used with the additional deposition of fat in depressed areas which have been deliberated. These cases are done with a 10 to 20 cc cannula to use the fat that has been harvested elsewhere.

Discussion

In primary or secondary cases when an excess of skin is present and exhibits a cascading surface, the technique of superficial liposuction using small cannulas will allow the skin to retract properly. Two different processes are available. One process consists of utilizing an all-level liposuction allowing skin retraction. Another process consists of limiting the suction to the superficial layer ending up with the same skin retraction without much reduction of the deep fat deposits. The incision is similar to liposuction incision and position of the patient is often a lateral decubitus. The superficial liposuction is effected until the skin can be grasped and elevated from the tissues below it showing the thinning of the subdermal level.

This technique should not involve cutting all the strands of the skin in the cellulite release maneuver which is dangerous and creates large pockets, and the process should only extract the fat cells and leave the connective strands intact.

Cellulite Release Technique

In a similar technique to the superficial liposuction, the cellulite release technique is useful in cases of cellulite provided that the undermining is completely extensive and is only done in some areas to prevent the creation of a large pocket which then would end with complications similar to the earlier liposuction cases with wide undermining.

Anesthesia

General anesthesia is the procedure of choice, however, if only a limited area needs improvement this can be infiltrated with a diluted solution of xylocaine with epinephrine.

Markings

It is important to mark most of the deeper dimples observed on the buttock, the hips and the thighs since it will be necessary not only to sever accurately the retaining ligaments responsible for the dimples but also it will be necessary to fill these depressions with some autologous fat.

Position

Any position can be useful. The prone position and the lateral decubitus can be used easily.

Incisions

The same incisions used for liposuction can be reused for cellulite treatment especially for the hips, the thighs, the saddlebags and the buttocks. The lateral hip incision, the inner gluteal incision and a posterior paraspinal incision are adequate for this treatment.

Technique

A sharp-end square or a V-shaped cannula (Aiache) is used to free the septa attaching the skin to the SFS and these are freed by methodical action of the to-and-fro movements used for suction. The cannula remains superficial under the skin, and since it has a cutting effect, using repeated to-and-fro motions is performed until the retaining ligaments are severed.

Control of superficial freeing of the cellulite is similar to the superficial liposuction technique. It is possibly a similar action, however, the cutting cannula helps in freeing the deep retaining ligaments.

In cases of old-age cellulite, the additional technique of cutting the connections attaching the skin to the deeper SFS is used. The fat has been harvested during the suction procedure and it can be reinjected at the time of the superficial cellulite release. Any cannula can be used for this action. Many different instruments have been devised for cutting the strands holding the scar tissue down to the deeper layers or the fibrous retinacula holding the skin down to the SFS. The superficial suction technique is then used and moderated by palpation and lifting the skin of the deeper layers trying to tear away the remaining septa. This technique allows a smooth even layer of skin. Closure of the wound is done as usual and compressive garments are then used for a few weeks.

In short, this technique of superficial liposuction and cellulite release has added a new dimension in the liposuction technique allowing a better result and even surface of skin.

Advances in Liposuction

Liposuction with Different Systems

After the technique of liposuction was tailored to become conventional and to become more organized, many authors have proposed advances in the technique and the apparatus for this procedure. There are many new findings and some of them have been more successful than others. One of the examples include ultrasound liposuction which is utilized to melt and dissolve fatty tissue by cavitation (US patent 4-886-491). This technique is making progress **(Figures 3-29 to 3-33).**

Another additional invention is the use of an auger within the lumen of the cannula to help in the removal of soft tissue (US patent 4-735-605).

FIGURE 3-29

Special equipment for the ultrasonic suction consists of a machine which is the ultrasonic generator. This is a piezoelectric hand-piece and a high power blunt tip probe made by LySonix 2000

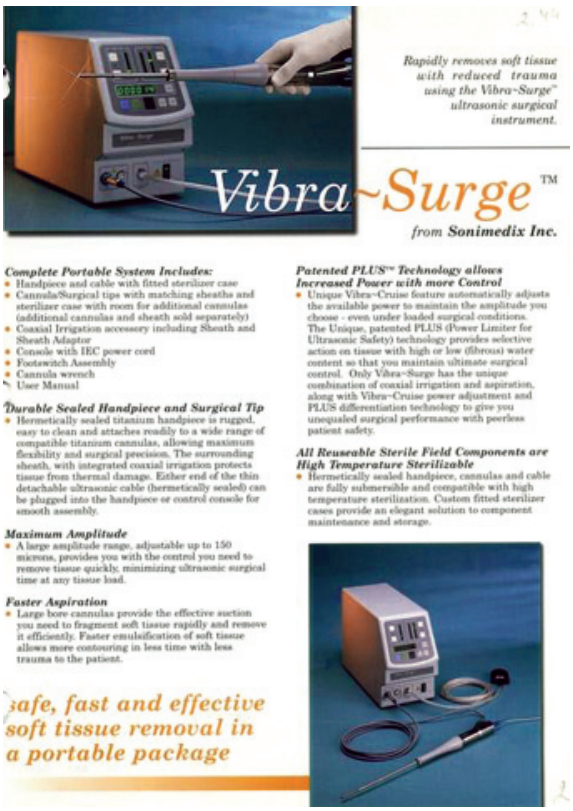

Vibra-Surge™
from Sonimedix Inc.
Rapidly removes soft tissue with reduced trauma using the Vibra-Surge™ ultrasonic surgical instrument.
Complete Portable System Includes:
Handpiece and cable with fitted sterilizer case
Cannula/Surgical tips with matching sheaths and sterilizer case with room for additional cannulas (additional cannulas and sheath sold separately)
Coaxial Irrigation accessory including Sheath and Sheath Adaptor
Console with IEC power cord
Footswitch Assembly
Cannula wrench
User Manual
Durable Sealed Handpiece and Surgical Tip
Hermetically sealed titanium handpiece is rugged, easy to clean and attaches readily to a wide range of compatible titanium cannulas, allowing maximum flexibility and surgical precision. The surrounding sheath, with integrated coaxial irrigation protects tissue from thermal damage. Either end of the thin detachable ultrasonic cable (hermetically sealed) can be plugged into the handpiece or control console for smooth assembly.
Maximum Amplitude
A large amplitude range, adjustable up to 150 microns, provides you with the control you need to remove tissue quickly, minimizing ultrasonic surgical time at any tissue load.
Faster Aspiration
Large bore cannulas provide the effective suction you need to fragment soft tissue rapidly and remove it efficiently. Faster emulsification of soft tissue allows more contouring in less time with less trauma to the patient.
Patented PLUS™ Technology allows Increased Power with more Control
Unique Vibra-Cruise feature automatically adjusts the available power to maintain the amplitude you choose - even under loaded surgical conditions. The Unique, patented PLUS (Power Limiter for Ultrasonic Safety) technology provides selective action on tissue with high or low (fibrous) water content so that you maintain ultimate surgical control. Only Vibra-Surge has the unique combination of coaxial irrigation and aspiration, along with Vibra-Cruise power adjustment and PLUS differentiation technology to give you unequaled surgical performance with peerless patient safety.
All Reuseable Sterile Field Components are High Temperature Sterilizable
Hermetically sealed handpiece, cannulas and cable are fully submersible and compatible with high temperature sterilization. Custom fitted sterilizer cases provide an elegant solution to component maintenance and storage.
safe, fast and effective soft tissue removal in a portable package

FIGURE 3-30

A company called Vibra-Surge has created the ultrasonic surgical instrument and it consists of the same three parts: (1) The power machine; (2) The hand-piece; (3) The cannula surgical tip

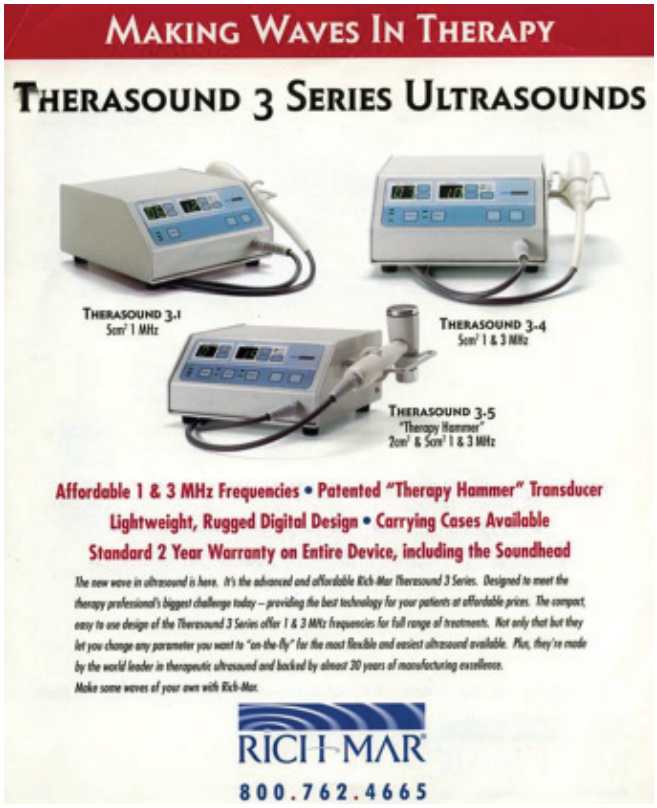

MAKING WAVES IN THERAPY
THERASOUND 3 SERIES ULTRASOUNDS
THERASOUND 3-1
5cm² 1 MHz
THERASOUND 3-4
5cm² 1 & 3 MHz
THERASOUND 3-5
"Therapy Hammer"
2cm² & 5cm² 1 & 3 MHz
Affordable 1 & 3 MHz Frequencies • Patented "Therapy Hammer" Transducer
Lightweight, Rugged Digital Design • Carrying Cases Available
Standard 2 Year Warranty on Entire Device, including the Soundhead
The new wave in ultrasound is here. It's the advanced and affordable Rich-Mar Therasound 3 Series. Designed to meet the therapy professional's biggest challenge today – providing the best technology for your patients at affordable prices. The compact, easy to use design of the Therasound 3 Series offer 1 & 3 MHz frequencies for full range of treatments. Not only that but they let you change any parameter you want to "on-the-fly" for the most flexible and easiest ultrasound available. Plus, they're made by the world leader in therapeutic ultrasound and backed by almost 30 years of manufacturing excellence.
Make some waves of your own with Rich-Mar.
RICH-MAR
800.762.4665

FIGURE 3-31

A company making external ultrasound machines called Rich-Mar

WELLS JOHNSON COMPANY
SILBERG E.U.A.™
EXTERNAL ULTRASONIC ASSIST
Combining external ultrasonic generation, infusion and temperature monitoring. The Generation V device for ultrasonic, soft tissue procedures.
Patented and Patents Pending.
A
WELLS JOHNSON COMPANY
SILBERG E.U.A.™
EXTERNAL ULTRASONIC ASSIST™ SYSTEM
B

FIGURES 3-32A AND B

External ultrasound machine (Wells-Johnson)

THE ACHIEVEMENT
A NEW STANDARD OF EXCELLENCE IN LIPOPLASTY
The elegant SoundVASER® system utilizes a completely new application of energy technology, housed in an ergonomic system design, to gently and quickly emulsify adipose tissue while limiting damage to collateral tissues such as collagen, vessels and nerves.
Elegant Design
The SoundVASER® Surgery System
A combination of three, perfectly coordinated systems, the elegantly designed SoundVASER® surgical platform enhances convenience, ease of use and patient care.
PRECISION FLUID MANAGEMENT SYSTEM
Precise and convenient fluid administration and aspiration are now possible with the optional Precision Fluid Management system that controls administration accuracy to within ± 1 cc at any volume. The Precision Fluid Management system is also a substantial time-saver in filling breast implants.
SoundVASER® GENERATOR
Coupled with the breakthrough solid, grooved VASER Probes, the SoundVASER® power generator is a major technological advance over earlier devices. Two step fragmentation and aspiration reduces energy required and maintains tumescent volume. A combination of grooved probe design and advanced energy physics selectively targets the larger adipose cells while limiting damage to tissues that should be preserved. The smaller, solid probes allow for smaller incisions and access to all target areas. Using ultrasonic vibrational energy greatly reduces the required physical manipulation and resulting fatigue for the surgeon.
VentX™ ASPIRATION SYSTEM
The quiet and gentle VentX™ aspiration system coupled with smooth, multiport cannulae, is used after fragmentation to remove tumescent fluid and dissolved tissue with far less suction power requirements than traditional aspiration devices.
PROVEN CLINICAL PERFORMANCE AND ACCLAIM BY LEADING SURGEONS
The SoundVASER® system is now recognized by leading cosmetic surgeons as the next major step in the evolution of the Lipoplasty procedure. True "Body Contouring" is now a reality.

FIGURE 3-33
Vaser machine, excellent for ultrasound suction

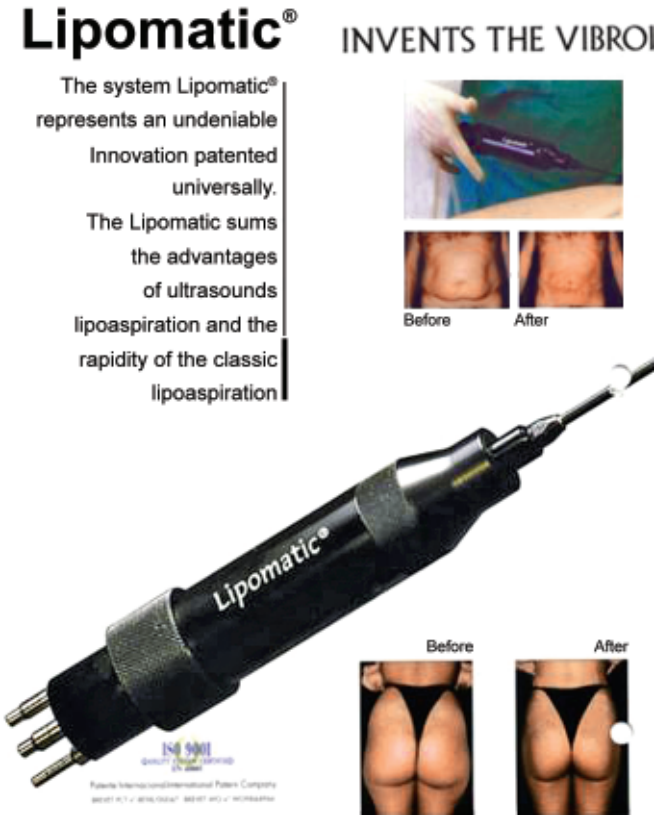

Lipomatic®
INVENTS THE VIBROI
The system Lipomatic® represents an undeniable Innovation patented universally. The Lipomatic sums the advantages of ultrasounds lipoaspiration and the rapidity of the classic lipoaspiration
Before
After
Lipomatic®
Before
After

FIGURE 3-34
The new machine by MicroAire making a vibrating cannula with back-and-forth motion of 3 mm facilitating the action and speeding-up the process the machine

Another instrument developed by Surgitek Corporation is the use of a reciprocating tip cannula which was developed by companies such as MicroAire and other companies such as Vibra-Surge from Sonimedix, Inc. **(Figure 3-34).**

Other additional work was done in using electrocautery within a cannula tip or a high pressure saline jet spray located at the tip of the cannula which was developed by Val Lambros.

Since these systems have not been completely investigated and developed aside from the ultrasound technique, they are not going to be discussed.

Another system was developed by Thomas Dressel who uses the Nd:YAG laser for improvement on the liposuction. The cannula utilizes a quartz glass fiber delivery system designed to deliver up to 100 watts at the fiber tip (35,000 joules by CM2). The fat is then aspirated by suction through the cannula side hole and it is then cut and coagulated by the laser beam. A group of plastic surgeons have been named as investigators in the technique.

The first laser-assisted liposuction was performed on January 2, 1990 within an IRP protocol on a 34-year-old male with abdominal lipodystrophy. Other cases have been included.

Operating Room Protection against Vapor Contamination

Aerosols are an efficient mechanism by which infectious agents normally unable to penetrate through the protective skin will enter the respiratory tract and through it enter the blood stream. The exposure of open wounds to the aerosols can also cause infections if a pathogen is within the aerosol.

The technique of liposuction vaporization creates an aerosol of fat and small amount of blood which results in a liposanguinous aerosol. These particles could contaminate if they contain bacteria or viruses. Especially since this is a potential hazard, a number of reports have been shown correlating aerosols with infection. The use

of a filter withstanding the flow rate achieved is a way to control this contamination. This frequent cause of acquired infections such as inhalation is suspicious and it is advised to use filters in the cannula in order to protect the surgeon, the nurses, and other people attending the operating room.

Ultrasonic-assisted Lipectomy

Researchers have developed an ultrasonic generator with a special probe made of titanium. This system ends up with a fat liquefaction which is then followed by suction. The cavitation caused by the ultrasonic energy acts on the liquid within the fat cells and has no effect on nerves, vessels or other connective tissue.

Physics

Ultrasound waves are produced by transforming a normal electric energy into high frequency energy. This energy is transmitted by piezoelectric quartz crystal or to a ceramic transducer transforming it into mechanical vibrations. Over 12–20 KHz of energy is generated and although it is too low to be perceived by the human ear, nevertheless has the action in the tissues. The ultrasonic waves, like all sounds waves, have an expansion and compression cycle. The compression cycle exerts a positive pressure on the fluid molecules and the expansion cycles exert a negative pressure. A sound wave of this adequate intensity will end up generating microcavities during its expansion cycle. In low density tissues molecular cohesion being weak allows the ultrasonic effects to occur.

When the tissues are exposed to negative pressure of an expansion cycle of a sound wave, the gas in the empty spaces expands until a little bubble is formed in the tissue. If it is a large bubble, it tends to explode destroying the fat cell and liberating the fat. If the microcavities are overexposed to ultrasonic energy, they are affected by the alternative expansion and compression cycles of the sound waves making the bubble expand and contract. The increase in size of the cavity depends on the intensity of the sound waves. The surface of the microcavity produced by low intensity ultrasound is slightly bigger during expansion cycles and during compression thus the amount of gas diffusing expands and exceeds the compression cycle. The biologic effect of ultrasonic energy on adipose tissue consists of: (1) a micro-mechanical effect breaking up chromosomes and micromolecules; (2) effect connected with the cavitation phenomenon, ending up in explosion of the fat cells; (3) thermal effects which are sometimes difficult to control during the liposuction performed on patients.

Surgical Procedure

The technique of ultrasonic-assissted lipectomy (UAL) consists of an infiltration with ultrasound waves and then aspiration of the liquified fat. Very accurate preoperative markings are made and a large volume of hypotonic fluid is infiltrated into the treatment site as it is done with the tumescent technique. Then the technique consists of introducing, through strategically located incisions, a hollow titanium probe connected to the ultrasonic generator via a handle that contains the ceramic piezoelectric conductor. The ultrasound is started at the same time the suction is undertaken and the probe is moved methodically throughout the tissue in a slow, regular manner and in a crisscross pattern similar to the liposuction technique. Liposuction is performed at the same time as the fat destruction occurs by the ultrasound.

Completion of the treatment is done with what is termed refinement consisting of simple suction without ultrasound to equalize the areas that have been destroyed and suctioned, in addition to feather the edges to prevent sharp demarcation of the treated tissues in juxtaposition to the non-treated tissues.

Comments

This technique of ultrasound-assisted lipectomy has given the following advantages to liposuction: (1) because it actually liquefies the fat, there is less surgeon's fatigue during the application; (2) when it is combined with regular suction it accelerates the length of time to perform this technique since before the hollow cannulas, the solid cannulas were only dissolving the fat and a second pass was necessary to aspirate the fat.

It is usually a procedure that produced less blood loss than the regular techniques especially if a tumescent infiltration is performed at the same time. Although there has been no significant difference in the postoperative period, i.e. bruising, swelling, irregularities, it is found that the final results have been similar to the liposuction. The only disadvantage of the technique consists of the price of the machine and the cannulae which have to be replaced after 30–40 hours since they breakdown, and the potential for burns, which are usually occurring at the tip of the cannula if it is not moved constantly and in the zone of incision where the constant friction of the probe can destroy the skin edges. Some preventive measures such as the wound protection devices and the cooling of the cannula has been of some help in this process.

External Ultrasound Assist with Liposuction

Although external ultrasound has been used for a long time for many conditions, it has been shown by Silberg[5,6]

that it can be used under the skin after the infiltration of the zone to be suctioned is done in a tumescent type of technique. The external ultrasound is used and apparently will end up with a smoother liposuction and a more even result. At this time, other surgeons are claiming that the use of the external ultrasound machine can in itself be sufficient to resolve some fat deposits without any concurring internal suction and that the simple administration of the ultrasound to the fat tissues will help in dissolving them. These claims are still to be proven by the test of time.

As far as the external ultrasounds are concerned in the pre- and postoperative care of internal liposuction, there seems to be a consensus of opinion that the liposuction becomes easier to perform, it yields a bloodless liquid fat, and apparently it makes the mechanical technique easier to perform physically ending up in less fatigue to the surgeon. Again, these claims are to be proven by the test of time.

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4 Saddlebags

Adrien E Aiache

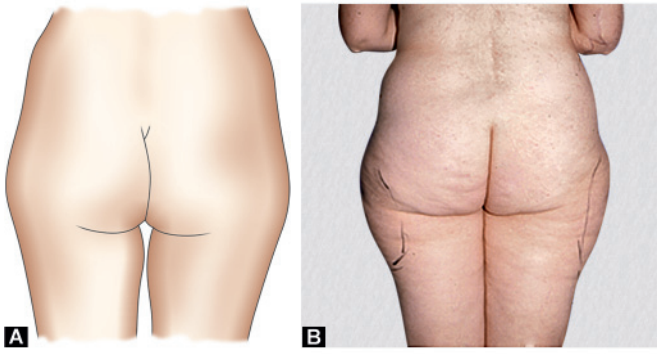
ABSTRACT

The so-called "saddlebags" deformity consists of fatty deposits just below the hips. The deformity continues laterally and posteriorly under the buttocks often mixing with the buttock excess resulting in a buttock without a fold or in a deformed lower thigh. The infragluteal fold is lost or deformed and will have a downward slant laterally. The indications for treatment and the techniques are described in this chapter.

Introduction

The so-called "saddlebags" deformity consists of fatty deposits just below the hips. The deformity continues laterally and posteriorly under the buttocks often mixing with the buttock excess resulting in a buttock without a fold or in a deformed lower thigh. The infragluteal fold is lost or deformed and will have a downward slant laterally **(Figures 4-lA and B)**.

In the past, the treatment for this problem consisted of the trochanteric lipectomy which was leaving an extremely extensive scar. This technique was developed by Pitanguy. It is still performed on old patients with excess skin that cannot be improved by simple suction. These large excisions were also resulting in secondary deformities and scar problems which were worse than the original one.



FIGURES 4-1A AND B

General appearance of the violin deformity consisting of an iliac crest excess and saddlebag excesses on the same patient

Indications

Unsightly lateral thigh area just below the hip, which does not respond to dieting or exercises, is the major indicating factor. Some patients with this condition will have tried desperately to reduce weight but to no avail. All types of treatments used by quacks such as body wrapping, herbs, massages, and regimens with applications of creams, ointments and liquids have been sold to a credible public. Liposuction is the most successful treatment in correcting this deformity.

The slightly obese female saddlebag problem is more severe than of the more obese patients since the fat cells

in this area are particularly prone to overdevelop and accumulate. Thin patients with very minimal saddlebags will nevertheless exhibit excellent results with these exercises.

The Cellulite Question

Cellulite is a different entity and was confused in the past with the saddlebag deformity. Cellulite itself can be corrected with the techniques that have been described in the preceding chapter.

Contraindications

Patients such as older women, especially those with soft skin, irregularities, bumps, peau d'orange and depressions should not be considered as the skin will not drape well, leading to a "golf-pants" effect as a variation of the saddlebags. Irregular bumpy skin with cellulite effect will only improve slightly unless the cellulite treatment is performed, especially with the new technique of superficial liposuction and cellulite release technique.

Age

Age is important since patients over 40 often present looseness of tissue with wavy and irregular multiple bumps which is called cellulite of old age. This non-elastic skin will remain bumpy and wavy unless a thorough superficial liposuction is performed to improve the area. Patients who are under 40 and who have good skin tone should be selected for this type of surgery. If patients are in the contraindication category, they must be warned of the possible complications and problems associated with the technique, i.e. irregularities and bumps of the skin, although in some cases no warning can deter these patients.

Caveats

The saddlebag area could produce dents and bumps if the suction is performed in a non-homogenous way. This area is "unforgiving" of excessive liposuction since the fat lies on a non-yielding portion of the body, covered by the tensor fasciae latae (TFL), where any loss of fat in uneven areas will show. To obviate this problem, superficial liposuction is indicated and will help in correcting the early problems created by uneven suction. The area of the saddlebags contains fat in two compartments, one above the superficial fascia system, and the other one below it and above the muscle. This zone of deep fat can be suctioned safely, however, in a lower part of the thigh, at approximately the middle third outer area, the two compartments will meet and the deep fat compartment disappears. If the liposuction is done in continuation of the deep extraction and it reaches this superficial level, very severe depressions can be created.

Symmetry

An important factor is the possible difficulty in achieving symmetry between the two sides of the thighs and the buttocks. Often one side is larger than the other, a condition which the patient may not notice until after surgery. This is a known phenomenon, which people discover only after surgery that they have some type of asymmetry that they failed to notice previously. The patient should be made obligated to pay more attention to their asymmetry before surgery. One should proceed in the following manner:

- Prior to surgery point out the differences in the two sides including the volume and location of the buttocks, the outer thighs and the buttock folds as well as any difference in shape, length and direction. Also, point out the location (height) of the saddlebag, its extent and its shape.
- Try to correct the asymmetry during surgery, by removing unequal amounts of fat, until a symmetrical correction is achieved.
- Relocate the buttock fold as shown in the following chapters.

Markings

The patient is marked before surgery in an erect position. This is the only position that will indicate the extent of the abnormality. Preoperative pictures are taken in the antero-posterior position, lateral position and oblique position. These photographs are taken before and after the markings.

The following procedure for making topographic markings is recommended: first the area to be suctioned is carefully marked off in the anterior-posterior position by marking a line to demarcate where the excess fat starts superiorly and inferiorly. Next, the anterior and posterior estimate of excess is made while the patient is viewed in the lateral position. Note that in this lateral position, the anterior and posterior estimates are difficult to establish but the pinch test is usually very helpful. These tests indicate which areas contain a fully excessive amount of fat as opposed to areas in which the fat digresses to a more normal thickness. The occasional dales or valleys are also carefully noted and marked off at this time so that

no excess liposuction will be done. The area of thickest fat protrusion should especially be marked with crosses to indicate the need for more concentrated suction. There is a very elective spot in the outer posterior saddlebag part that is the subject of extreme precaution since there is a large excess of fat that can be corrected only if one is actively aware of it. The patient is turned anteriorly, posteriorly, medially, and in three-quarters in order to assess the exact volume and shape of the excesses which are then marked accordingly **(Figures 4-2 to 4-8)**.

If infragluteal folds are to be made or improved, their position should be precisely noted since patients will often have different height gluteal folds due to a congenital problem, spinal scoliosis and unevenness. The lower part of the saddlebags at a junction with the normal thigh must also be carefully marked to prevent depression secondary to suction below this point **(Figures 4-9A and B)**. Too aggressive an approach could result in problems difficult to correct the fat area and it would endup with severe depressions just over the TFL and below the saddlebag area.

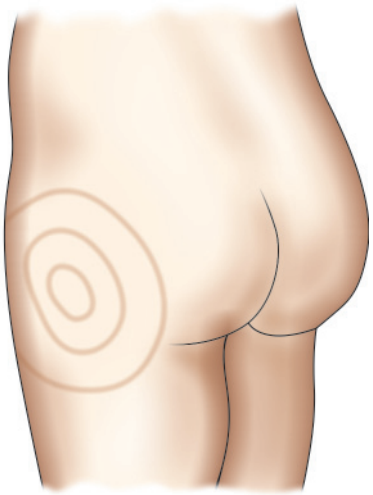


FIGURE 4-2
The topographic markings, although helpful in figuring out the excesses in diminishing stages, do not really represent to be done and in this particular case it would be insufficient

FIGURE 4-3
Markings for moderate saddlebags liposuction. Notice their extent

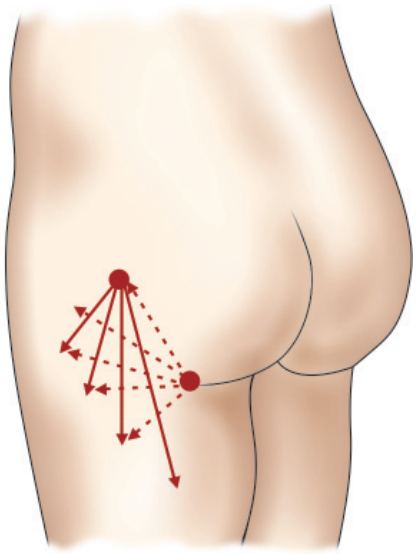


FIGURE 4-4
The reality of liposuction is that it removes fat along the trajectory of the tunnels and leaves fat in between those tunnels. Crisscrossing ensures a more homogenous removal of fat

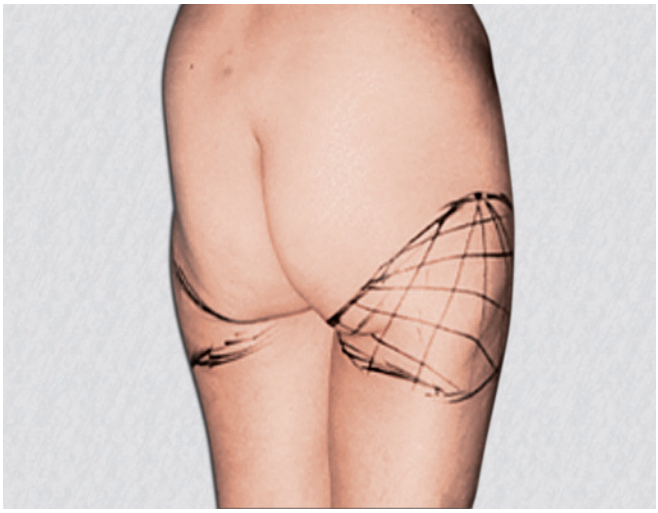


FIGURE 4-5
Depiction of the crisscrossing from two different incisions for liposuction in the determined area. Note the amount of lower buttock suctioning encompassing an area above the gluteal folds

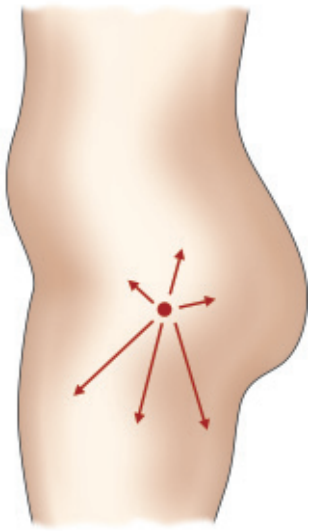


FIGURE 4-6
A favored approach for saddlebag liposuction is the incision above the hip. The cannula remains flat against the muscle fascia and sweeps the whole area. The same incision can be utilized for hip suction or the buttocks

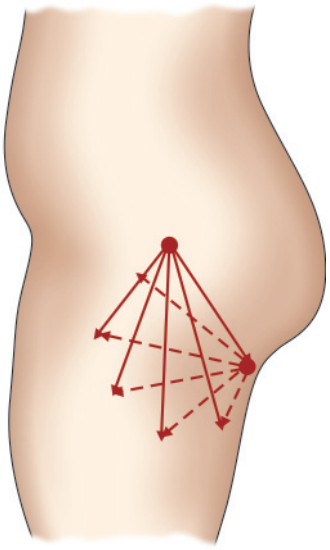
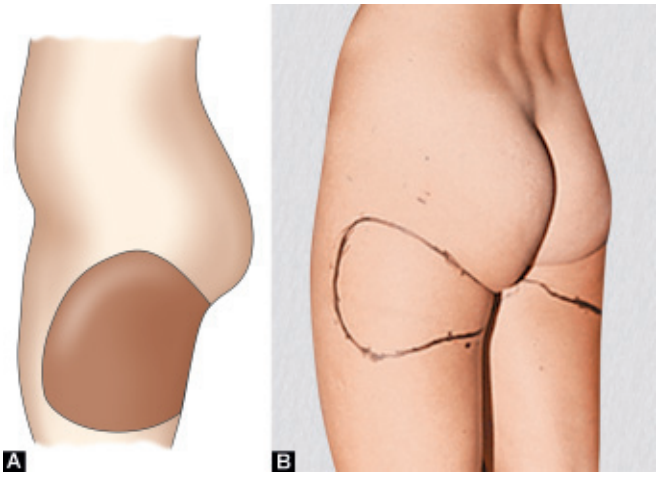


FIGURE 4-7
Demonstrating the crisscross techniques for saddlebag suction

FIGURE 4-8
Crisscross suction of saddlebags with the markings for feathering of the upper part of the gluteal fold. Feathering should be done in all cases to ensure a small contour



FIGURES 4-9A AND B
Saddlebag liposuction involves the whole lateral aspect of the thigh anteriorly until the protrusion is corrected in the anteroposterior view

Anesthesia was discussed in previous chapters. General anesthesia is preferable although local anesthesia can be sufficient when the deformity is very moderate and the patient is cooperative. The local anesthesia allows, in addition, the proper variation in positioning of the patient that can even be put in the erect position for correction of their problem. The author prefers the prone position for liposuction. The hip incision and infragluteal incisions are marked, incised and prior to suction the tumescent infiltration is performed as indicated in the previous chapters.

Location of the Incision

The medial third of the infragluteal fold was the original incision. This incision is convenient since it allows the

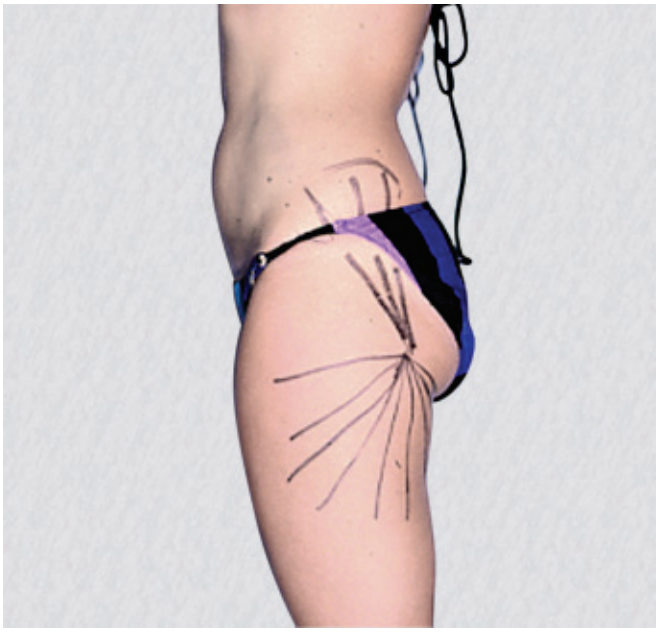


FIGURE 4-10

An incision in the lateral gluteal fold can facilitate the approach for saddlebags and iliac crests liposuction as well as the buttocks

surgeon to reach almost all the areas situated over the posterior and lateral aspect of the thigh, the saddlebags, the buttocks and the hips as well as the inner thighs. The inconvenience consists of the fact that it is difficult to suction properly the outer anterior aspect of the saddlebags and a second incision in the outer thigh will be necessary. This will allow the complete lateral hip and thigh suction as well as the iliac crest if necessary and the lower buttock. Through this incision, the author conducts the cannula under the gluteal fold as medial as possible helped in correcting the so-called "banana" which is due to the hypertrophy and redundancy of the infragluteal part of the upper posterior thigh. This technique is useful for the complete circumferential suction of the area **(Figure 4-10)**.

Prepping and Draping

The patient is prepped from the waist down to the midcalf area. It is important to visualize the knee and it might also be necessary to move the leg upwards or laterally to visualize the amount of fat to be removed. During the surgery an elevation of the iliac crest will give visualization in a tangential fashion of the whole outer buttock and saddlebag area.

Surgical Technique

The usual back and forth motion of the cannula from the incision point is used proceeding methodically in order to avoid missing areas, thus obtaining an even result. The crisscross technique is helpful to accomplish this goal and to even-out the fat aspiration desired. It is especially useful in cases of the infragluteal area where the thickest portion of fat is often present and a large amount of suction is necessary to obtain a new gluteal fold. 15–20 strokes are made in each tunnel using a 4 mm or 3 mm cannula at the beginning of the procedure. The continuation of the procedure for finer point is done using a 3 mm cannula. This technique has been done by the author using the ultrasound or using the vibrating cannula, or using simple, old-fashioned liposuction cannulas. During the surgery, the zones are pinched with the left hand and the cannula is introduced in the middle of the "sausage" to allow proper suction until a desired thinning is obtained. The suction proceeds carefully, observing the results during and after the procedure using visual observation, palpation and pinch **(refer Table 3-2)**. These three techniques are the only tools that the surgeon has, and although they are relatively simple and unsophisticated, their continual use should lead to satisfactory reduction.

Extent of the Liposuction

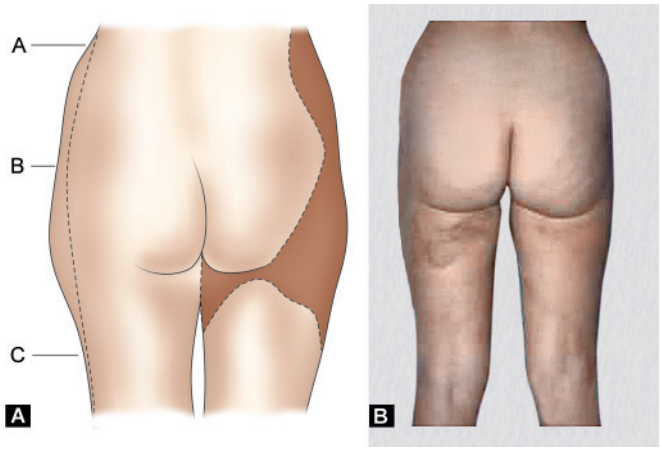
Liposuction is performed throughout the area marked for defatting. It should only extend slightly past the periphery of the area with the operator taking care not to extend further beyond an area which has been properly marked. Any changes in procedure during the operation can be a mistake especially if the surgeon is inexperienced **(Figures 4-11 to 4-13)**.

Refinements

They consist of feathering around the defatted areas and are particularly important in the lower thigh and anterior thigh areas since they might show irregularities if it is not done properly. Feathering consists of introducing the cannula with mild suction or without any suction and to extend the undermining to 1–2 inches **(Figures 4-14 to 4-17)**.

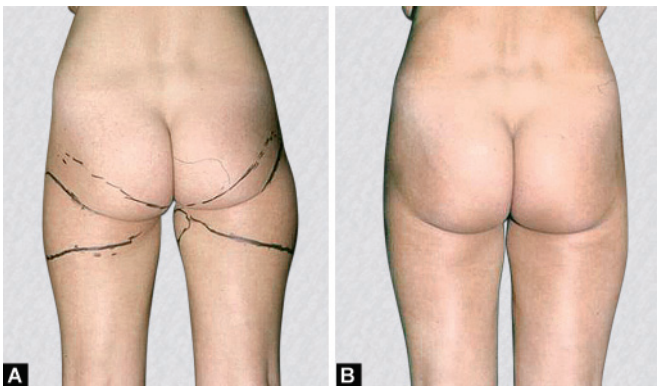
Gluteal Folds

A common problem encountered in saddlebag liposuction is the need to create a gluteal fold especially when it does



FIGURES 4-11A AND B

The aim of the surgeon is to obtain a gentle, smooth curve of the lateral aspect of the hips and thighs (dotted line) instead of the two fatty protrusions over the iliac crest roll and the lateral thigh. A, B, and C are the imaginary points to join in tracing the new contour of the thighs. Shading represents the area to be liposuctioned. The markings are made accordingly starting at A and ending at C



FIGURES 4-13A AND B

The "Bermuda shorts" marked up for saddlebags and upper thigh liposuction. Notice that this depiction of the Bermuda shorts will mark the deformity called the banana deformity, which has to be liposuctioned exhaustively to improve the area

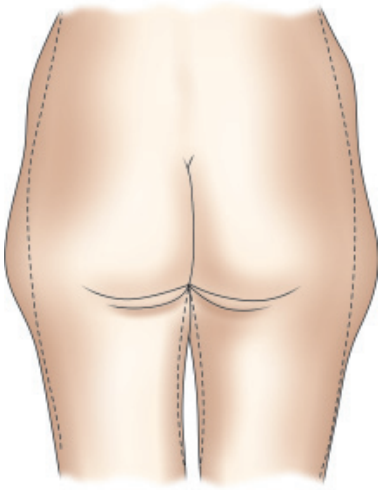


FIGURE 4-12

Final silhouette to be kept in mind (before liposuction) is shown by the dotted line. The final result (dotted line) represents the ideal normal silhouette as opposed to the actual shape in solid line

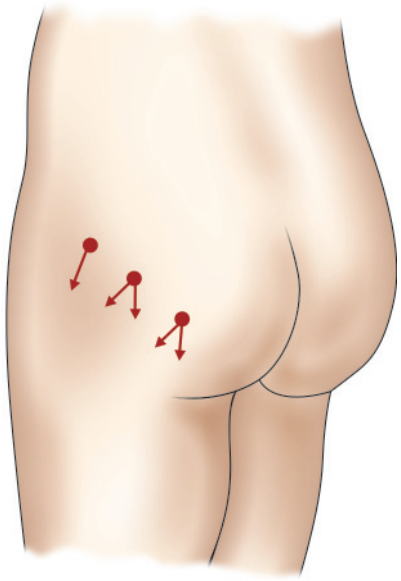


FIGURE 4-14

Two incisions, or three incisions can even be used for saddlebag suction, however, one usually suffices

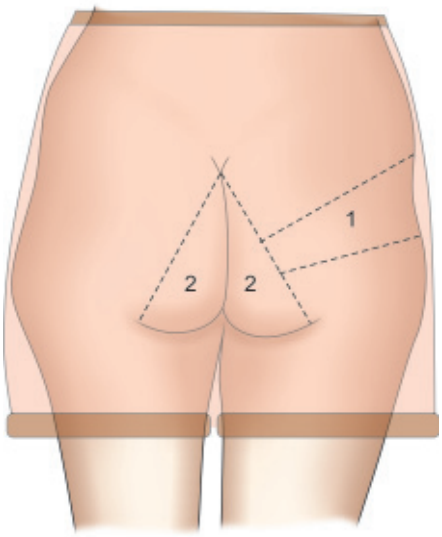


FIGURE 4-15: THE BERMUDA

The liposuction area encompasses the whole surface of the Bermuda shorts, however, it avoids suctioning the "Bermuda triangle" marked by 2, which would flatten the buttocks too much resulting in a pancake bottom. Avoid!!! liposuctioning the two triangles: (1) The triangle over the femoral neck is mostly devoid of excess fat. Liposuction in this area may result in the same "violin" deformity. (2) represents the Bermuda triangle to be avoided as described by Illouz

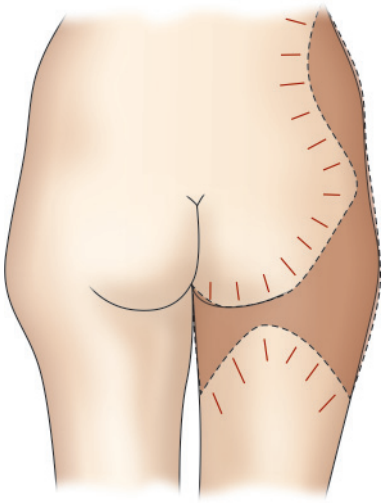


FIGURE 4-16

Feathering of the periphery of the suctioned areas

FIGURE 4-17

Often it is important to avoid penetrating the fascia layer as may happen in trying to reach a distant area and tenting of the skin with a long cannula. The opening situated too distally will, in addition, aspirate some subcutaneous fat if the cannula is pushed against the skin without discrimination

not exist or if it is oriented downwards and laterally. In order to correct the fold or to even suppress it, greater suction in the area above and below of fat deposits is performed and may require a secondary treatment to obtain a proper reduction.

In summary, liposuction allows large amounts of fat to be removed through very small incisions.

Technique Overview

Since the early years of liposuction, no notable advancement or change in the technique used for treatment of this area have occurred except for: (1) smaller cannulas that take more time, however, prevent deep dents or depressions; (2) superficial liposuction which improved the skin contour and irregularities; (3) tumescent infiltration which affords less bruising and bleeding and more homogenous results; (4) ultrasound liposuction which for some surgeons is very helpful in achieving the desired results; (5) mechanically oscillating cannulas which make the procedure faster, more efficient and less physically challenging **(Figures 4-18 to 4-24)**.

Complications in Saddlebag Suction Lipectomy

This area of liposuction is the most prone to problems, complications and dissatisfaction. It is difficult to remove the fatty deposits with a smooth transition from the rest of the thigh. The feathering technique described by Fournier is indicated. It consists of extending the undermining 4 inches further than the suctioned areas. A blunt cannula without an opening has been devised for this technique or a simple cannula without using much suction can be used for reducing some of the surrounding fat.

The complications consist essentially of waves, irregularities, bumps, depressions especially when the skin has been well defatted and there is still some overhang because the skin is adherent above and below the area of suction. The undermining of the skin should extend beyond this area of liposuction.

FIGURE 4-18
Large saddlebags should be extensively defatted. Note that the estimate will often turn out to be insufficient. Also, notice the difference between the right and left buttocks here. The right saddlebag has been suctioned along and between the dotted lines

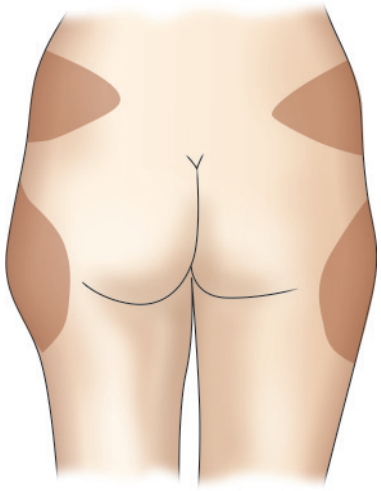


FIGURE 4-19
Wrong distribution of fat liposuction in the iliac crests and saddlebags which results in insufficient removal

FIGURE 4-20
Conservative estimate of the removal as shown here does not represent the reality of necessary suction

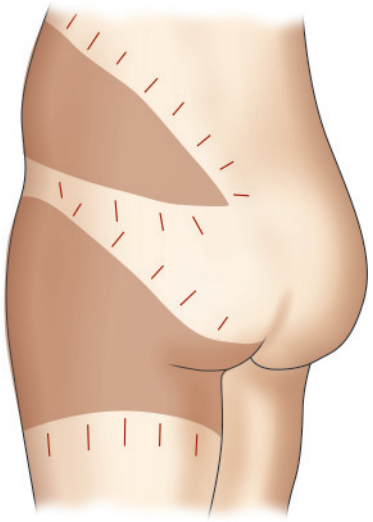


FIGURE 4-21
A more adequate estimate shows the actual extent of suction necessary for a harmonious result

FIGURE 4-23
Extremely large saddlebags and buttocks in obese patients are often done in two stages for two reasons: (1) The inability to assess exactly the amount of fat to reduce for an exact result; (2) In view of excessive amount of fat removed, over 3000 cc. Autologous blood transfusion is helpful in recovering the blood loss, in addition to the tumescent technique which will reduce the amount of blood loss extensively. These techniques have facilitated larger removals without any difficulties

FIGURE 4-22
Inadequate removal of a very large patient (5 feet 6 inches, 165 pounds). Approximately 3 liters were removed. The design of suction should include the periphery of the infragluteal area

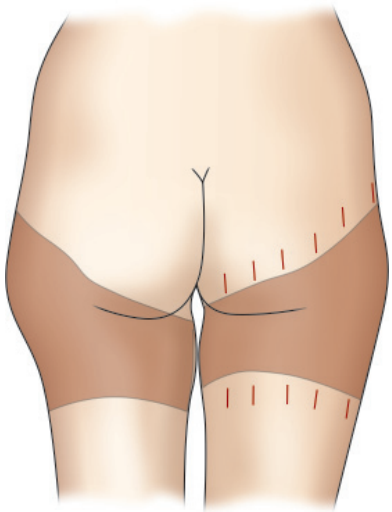


FIGURE 4-24
The entire extent of the saddlebag and posterior thigh suction is depicted here. Feathering is indicated at the periphery of the suctioned area

A particular area of complication is the anterior part of the suction of the thigh since it leaves a depression which is difficult to improve. The author prefers an upper trochanteric incision which allows smoother removal of fat without causing depressions **(Table 4-1)**.

TABLE 4-1

Complications in saddlebag lipectomy

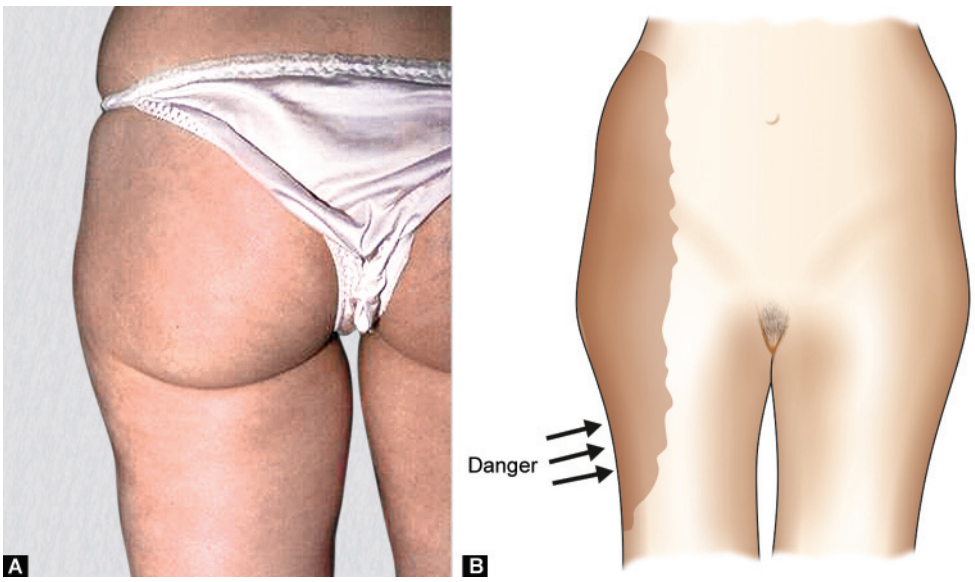
Dents	**Uneven or unequal**
Infection (rare, often sterile)	Rare, often sterile abscess
Ways of avoiding complications:	
❖ Suction from two different points (Crisscrossed)	
❖ The anterior part of the saddlebags should not be suctioned from the gluteal crease	
❖ Careful to stay deep	
❖ Do not perforate the superficial fascia of the thigh unless superficial liposuction is undertaken as a full process of the surgery **(Figures 4-25 to 4-37)**	

FIGURE 4-25

The thin patient with minimal bulges. Even if they are thin, many patients are still unhappy about unsightly bulges over their body such as the iliac crests, saddlebags, inner thighs and poor gluteal folds. In the thin patients with moderate saddlebags the results can be quite gratifying especially in cases of thin bodies with only slight excess which might not be apparent to the untrained eye but may be very important to a patient such as a dancer or a model. Improving the saddlebags and the gluteal crease will be a very important positive gesture in these cases where the beauty of the body is marred by the defect which become only unquestionably apparent when one compares the pre- and postoperative pictures

FIGURE 4-26

Thin 28-year-old female six months postoperative from saddlebags liposuction. Notice the overall improvement in the shape of the upper thigh. The only problem is the double fold or "banana" often seen when insufficient upper thigh fat has been removed

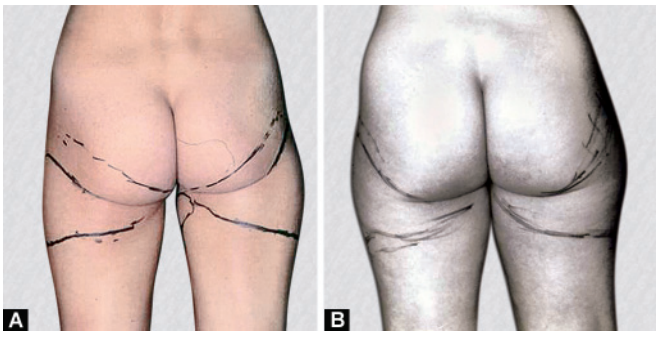


FIGURES 4-27A AND B

In thin patients only careful liposuction of the outer medial thigh will avoid the depressed areas shown here. This is the layer of fat between the skin and the tensor fasciae latae (TFL) that will not absorb any difference thickness since the TFL is very rigid

FIGURE 4-28

Area of liposuction depicted posteriorly. General area markings. The circle encompasses the extent of the liposuction



FIGURES 4-29A AND B

An additional band of liposuction will help create a well-rounded buttock and improve the infragluteal fold

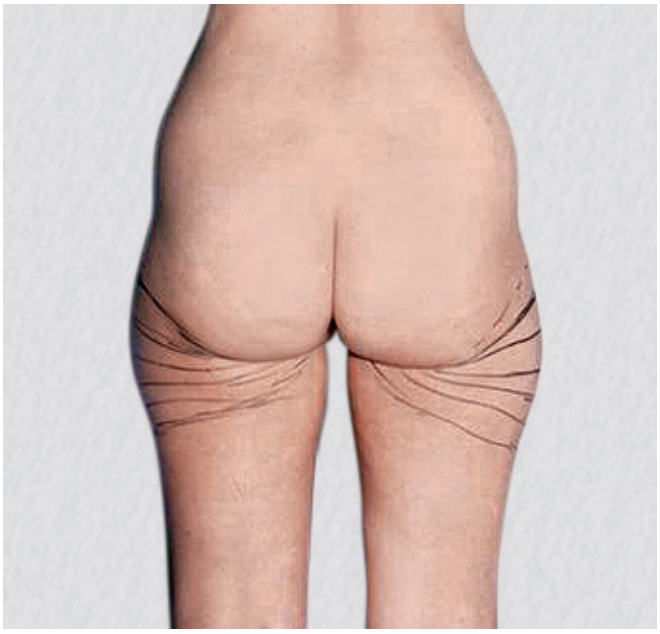
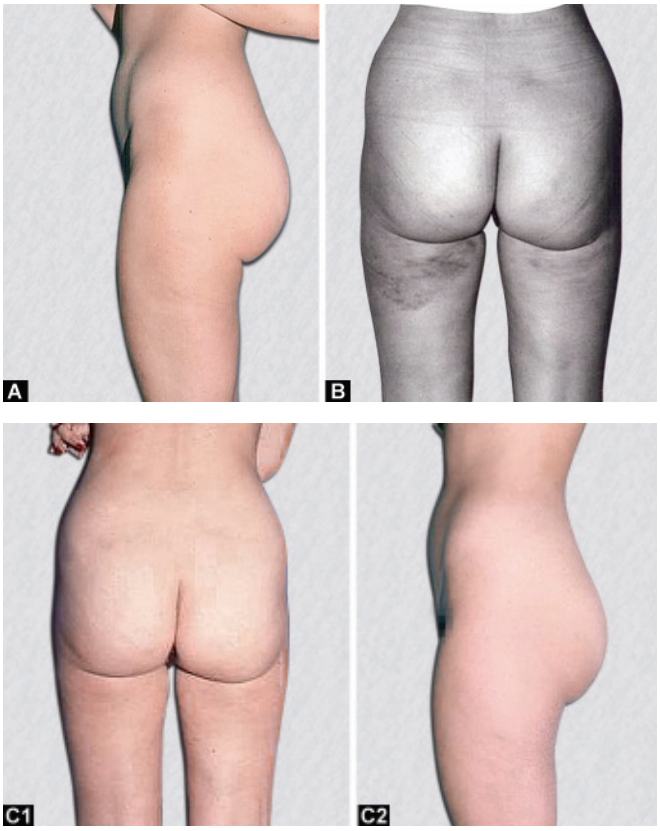


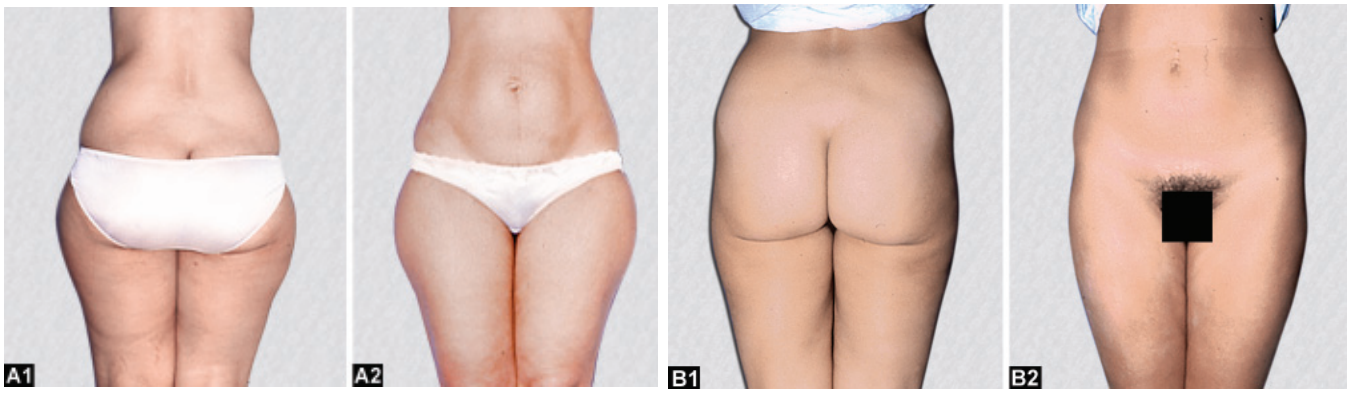
FIGURE 4-30

A 26-year-old woman with saddlebags. In patients with moderate lipodystrophy one has to be more precise in the suction especially in the area below the buttocks. Some of these patients should be very carefully selected and warned about the irregularities that will result from the surgery. Although these irregularities seem to be more the result of cellulite, it is nevertheless the duty of the surgeon to either avoid or forewarn these patients. The new superficial liposuction technique can be very helpful in these cases to smooth out the skin surface



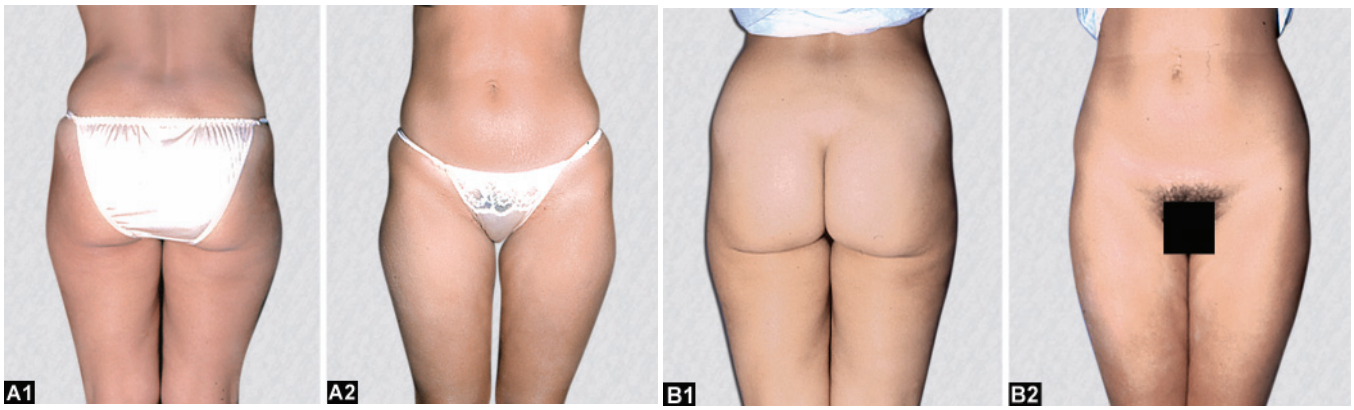
FIGURES 4-31A TO C

(A) Preoperative patient; (B) Early postoperative results showing the ecchymosis and edema in the treated area; (C) Six months postoperative after liposuction



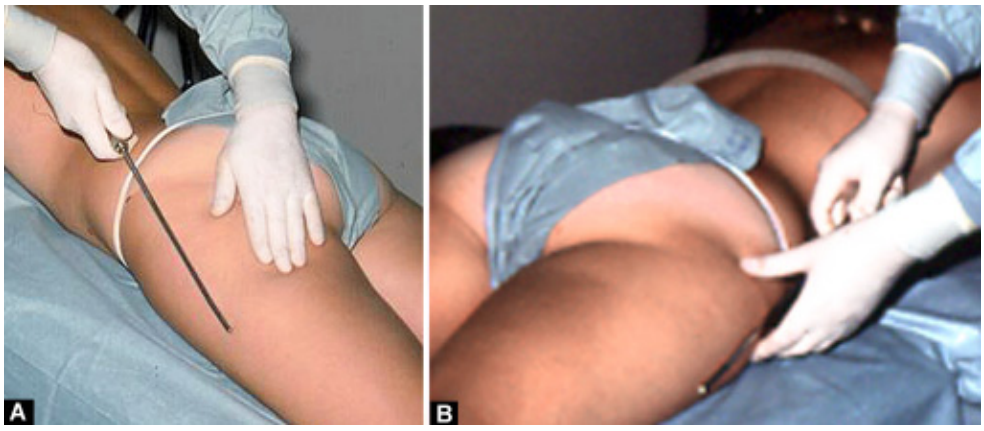
FIGURES 4-32A AND B

(A) Preoperative 27-year-old woman with large saddlebags; (B) Six months postoperative



FIGURES 4-33A AND B

(A) Preoperative 26-year-old woman with large saddlebags; (B) Six months postoperative saddlebag liposuction. Notice the extension of the gluteal fold that is going to fall laterally. Notice the iliac crest excess more prominent postoperatively although it has not been operated on

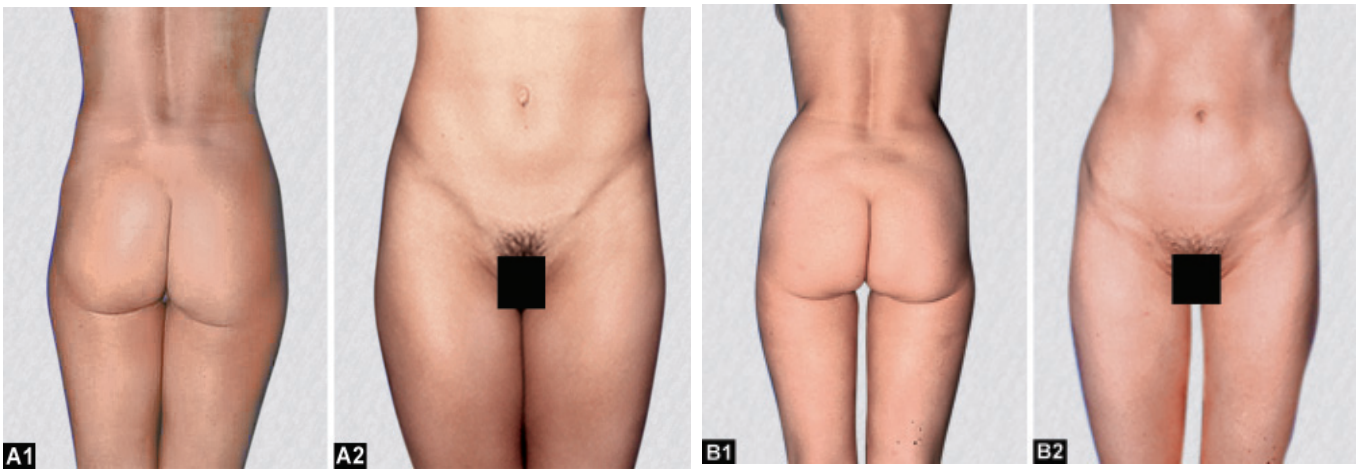


FIGURES 4-34A AND B

Liposuction performed in the prone position through a lateral incision in the bathing suit area. The hip incision will prevent dents and depressions and allow a smooth defatting

FIGURES 35A AND B

(A) Preoperative 35-year-old woman with small saddlebags. The patient was very insistent in having a correction. (B) Ten years postoperative



FIGURES 4-36A AND B

(A) Preoperative woman body builder with moderate saddlebags, inner thighs, and iliac crests; (B) Postoperative

FIGURES 4-37A AND B

(A) Preoperative 33-year-old woman with moderate inner thighs and saddlebag lipodystrophy; (B) One year postoperative after liposuction

5 Suction Lipectomy of the Buttocks

Adrien E Aiache

ABSTRACT

Buttock liposuction is most often associated with trochanteric suction. The large protuberant buttocks found in some patients are often embarrassing to them. The actual deformity consists of an extensive protuberance and thickness of the entire buttocks. In case of hyperlordosis, the protrusion is anteroposterior and exaggerated by the patient's body attitude. The deformity starts at the lumbar area and ends up at the gluteal crease often making the crease deeper and more exaggerated. In this chapter, the gluteal crease anatomy is described and the procedure of buttock liposuction is discussed with possible complications.

General Principles

Buttock liposuction is most often associated with trochanteric suction. The large protuberant buttocks found in some patients are often embarrassing to them. In the past no specific treatment was available. Although the Pitanguy type of surgery devised for treatment of the saddlebags and buttock lipodystrophy existed, this treatment was unsatisfactory since it left extensive scars in the gluteal fold. This operation did not correct the actual deformity creating a secondary deformity similar to the first one called a violin-type deformity. Problems associated with this surgery consisted of large, visible scars, secondary deformities and excessive morbidity following these extensive operations. Liposuction has brought a new approach that improved the prognosis. It allows a sizeable reduction of volume mass without skin excisions and without scarring.

The actual deformity consists of an extensive protuberance and thickness of the entire buttocks. Different shapes can be seen. In case of hyperlordosis, the protrusion is anteroposterior and exaggerated by the patient's body attitude. In some cases where only mild obesity is present, the buttocks seem to have developed more than the remaining part of the body. The deformity starts at the lumbar area and ends up at the gluteal crease often making the crease deeper and more exaggerated. The gluteal fold can be transformed in its direction going outwards and downwards instead of upwards, or even sometimes not existing at all.

Suction lipectomy consists of removal of the bulk of the fat in the buttocks. This surgery is used for cases, in particular, called steatopygia. This type of deformity is a combination of hyperlordosis and over development of the fatty layers of the buttocks. It is treated in the same fashion in the African-American or in the Caucasian. Other causes of the deformity are age, postpartum obesity and generalized glandular problems such as myxedema.

Indications

Patients who have large buttocks associated with large trochanteric size and iliac lipodystrophy are good

candidates. Often patients who have a narrow pelvis will develop protuberant buttocks when they are gaining weight. There are no specific contraindications in reducing the size of the buttocks except for the usual medical contraindications for any type of surgery.

Contraindications

Patients who have hyperlordosis with excess spinal curvature develop a protuberance that appears more excessive than it is in reality. One should not fall into the trap of suctioning an area of the buttock which has no real deformity that could end with deformed smaller buttocks.

Age

Although present in younger people, the deformity is more common in middle-aged females with short legs and a wide pelvis or in people with a narrow pelvis and often in African-American patients with hyperlordosis.

As the patients get older they develop more cellulite and cottage cheese skin. Besides the general health contraindications for this type of surgery, the esthetic contraindications consist of extreme heaviness or redundancy with sagginess of the buttocks.

Patients should be advised that short of a complete excision lipectomy of the lower part of the buttock, they will have a moderate improvement in their deformity. Other contraindications are the extreme amount of dimpling and cellulite present in the buttocks which will not respond to deep suction but will respond to superficial suction and cellulite release.

Markings

The patients are marked while standing. The incisions are placed in the inner third of the gluteal fold at the level of the hip and lateral to the sacroiliac joint allowing proper crisscrossing in the suctioning process **(Figures 5-1 to 5-6)**.

The "Bermuda triangle" is spared in order to allow some roundness of the buttocks after suction. The uses of the pinch test as well as the techniques of observation, palpation and inspection are complemented by photographic documentation in different positions.

The markings are made differently depending on the area to be suctioned in the vicinity such as the iliac crests, the saddlebags and the upper thighs. The gluteal fold is carefully elected and marked.

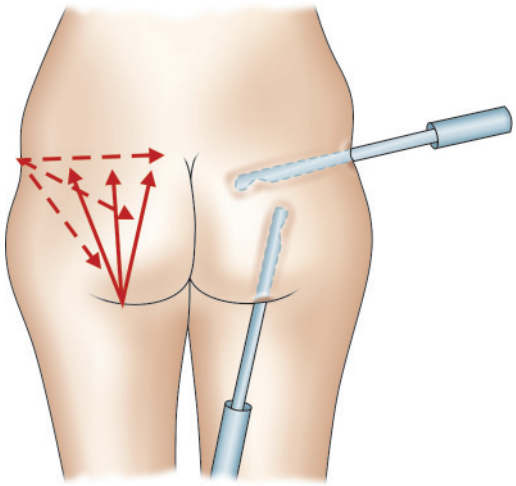


FIGURE 5-1

Liposuction is performed from a lateral hip incision and a gluteal fold incision. Making a crease. The liposuction is performed in the new crease for 2 or 3 inches until proper flattening and retraction is obtained. A deep crease is obtained by turning the suction cannula over with its opening up against the skin and by scraping the dermis of any residual fat. (1) The crease should not be too long laterally; (2) Defatting the area above and below the crease is done as usual; (3) The area immediately adjacent to the crease is defatted further emptying the subcutaneous fat; (4) The suction cannula is turned outward in an area along the new crease which is thinned out extensively in order to create an adhesion of the skin to the muscle

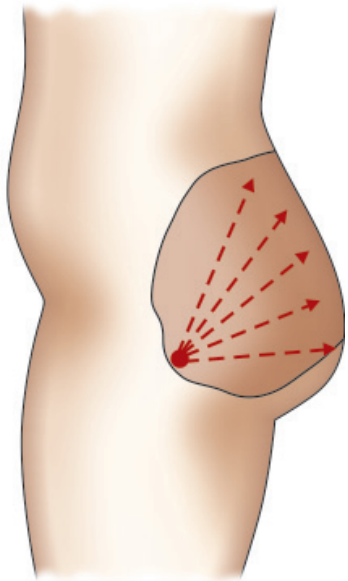


FIGURE 5-2

Buttock liposuction aims at reducing the overall size and protrusion of the buttock. It can be done through the lateral thigh approach as well as the buttock fold. 2–3 cm of thickness is to be spared

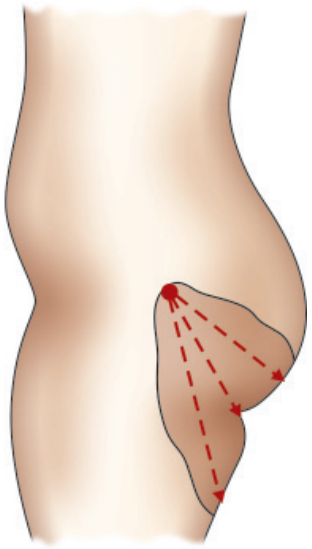


FIGURE 5-3

Liposuction of the thighs in the area immediately below is useful and although it will help in reducing the overall area, it may also contribute to the loss of support of the buttocks and a resulting sagging and flat buttock

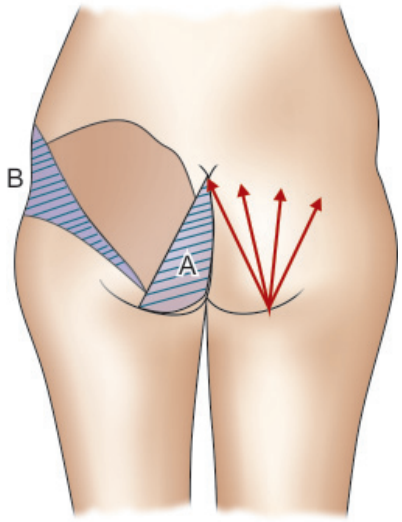


FIGURE 5-5

Buttock liposuction. The area shown indicates the extent of suctioning for proper shaping of the buttock

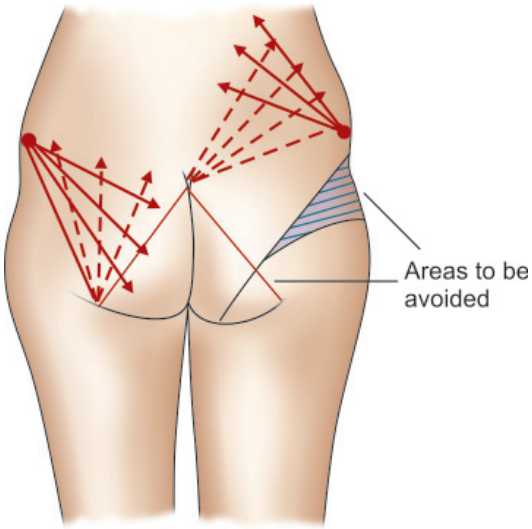


FIGURE 5-4

Crisscrossing from two incisions is useful. Incisions can be in the buttock fold and the lateral iliac area (left). In iliac crest suction, the suction can be in the lateral iliac area and the sacral area (right)

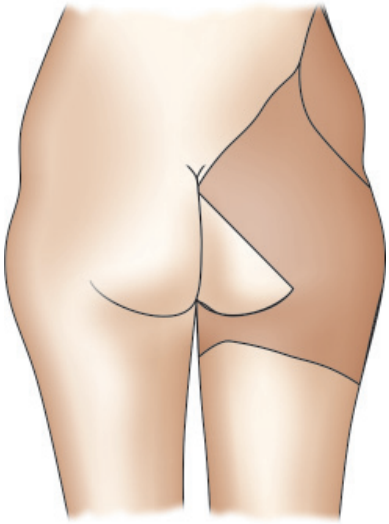


FIGURE 5-6

Buttock liposuction avoids the central triangle in order to keep some roundness to the buttock and prevent flattening. The lateral hip triangle (B in Fig. 5-5) is often preserved since it is already depressed. The liposuction process involves the whole buttock, avoiding the area of the “Bermuda triangle” situated in the inner part of the buttock and the outer triangle at the end of the trochanter is avoided in the same manner

Anesthesia

General anesthesia is most often complemented with a solution of diluted epinephrine for bloodless surgery in addition to the tumescent infiltration of the area. Local anesthesia is sometimes possible depending on the extent of the area to be reduced and the psychological attitude of the patients as well as their individual pain tolerance. The usual dilution of 0.1% xylocaine with epinephrine 1:1,000,000 can be used as a tumescent infiltration.

Prepping and Draping

After the patient has been anesthetized, draping is done with the patient in the prone position with the arms extended in a comfortable way. Draping consists of four drapes applied around the buttock area.

Technique and Instruments

Four and three mm cannulas are used for the procedure. The smaller cannulas are used for feathering and superficial suction for proper control of the suction. The suction is accomplished leaving a blanket of fat of approximately 1–2 cm of thickness. This is checked by using the pinch technique, observation and palpation. Crisscrossing is performed as usual, and at the completion of the procedure feathering is performed superiorly and laterally to allow a better slope of the skin from the suctioned area to the non-suctioned area **(Figures 5-7 and 5-8)**.

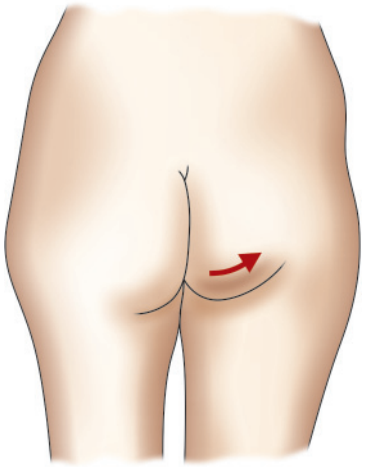


FIGURE 5-7

The creation of the fold is achieved by suction of the gutter below the buttock and thinning of the skin in the exact trajectory of the fold by turning over the cannula with the opening up

FIGURE 5-8

In making a crease the fold is designed in the proper direction. Defatting above and below it is then performed. The cannula is thrust between the grasping fingers of the left hand and the "sausage-shaped" fold is defatted thoroughly

Closure

5-0 nylon or 4-0 chromic sutures are used. Garments are then applied over a thick bandage for drainage of the area.

Discussion

Liposuction of the buttocks has proven to be an effective new treatment for a deformity which was uncorrectable in the past.

Morbidity is low and postoperative complications are minimal. Also, the success rate obtained by this new procedure is excellent.

The Gluteal Crease

An important aspect of the crease:

- It should be a noticeable feature
- It should have pleasant "smiling" configuration and direction
- It should be of a certain pleasing length ending smoothly on the lateral thigh
- It should be symmetrical in its position and orientation **(Figures 5-9 to 5-11)**.

Gluteal Crease Anatomy

The ileocutaneous ligament of Luschka holds the skin to the ilium with a fan-like structure giving the crease its shape on the buttock. From an esthetic point of view it

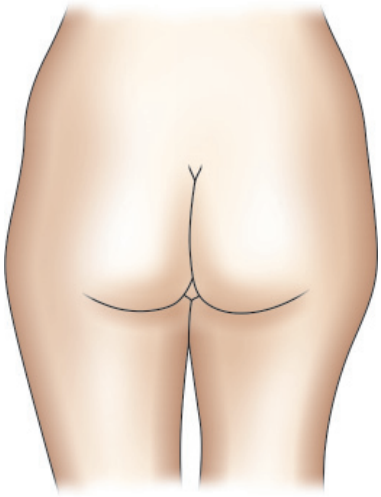


FIGURE 5-9
There is often no need to lengthen the gluteal fold, otherwise it will go too far laterally

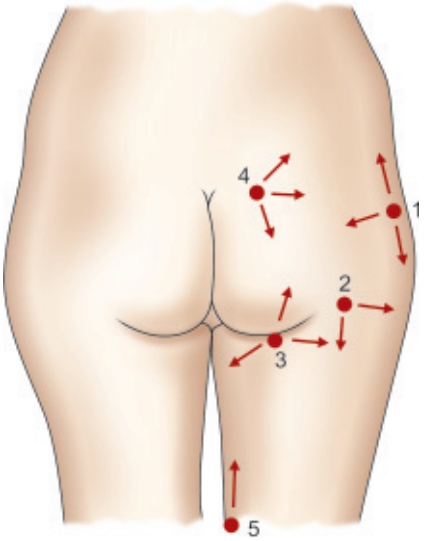
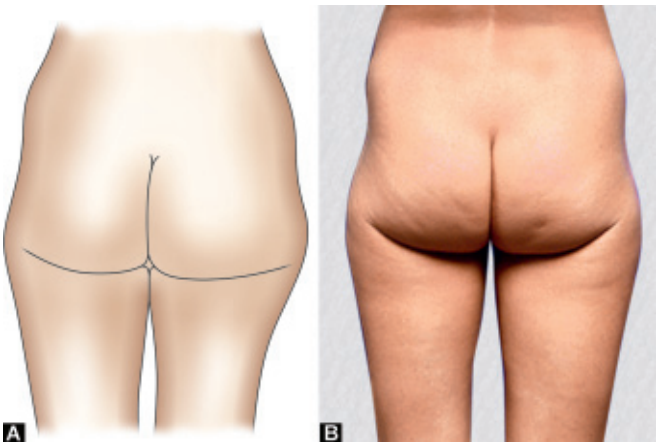


FIGURE 5-11
The gluteal fold should not be too long laterally since it does not improve the buttock from an esthetic point of view



FIGURES 5-10A AND B
Consequences of buttock and saddlebag liposuction showing prolongation of the buttock fold

is questionable if the presence of this is important. It is less often seen in tall, thin women with long bodies and lordosis.

It is fair to conclude that the existence of the gluteal crease is synonymous with the beginning of ptosis of the buttock as much as the inframammary fold is a sign of ptosis of the breast. The gluteal crease, being a fixed point, will show ptosis of the buttocks in cases of any excess or looseness and has been compared by others to the inframammary folds.

The "inverted" buttock fold was found undesirable by some surgeons; however, with proper examination with an understanding of the young pelvis it will be a commonly accepted characteristic associated with small buttocks, flat on the oblique view and a very short gluteal fold. To achieve these goals in creating a young-looking buttock the process is as follows **(Figures 5-12 and 5-13)**:

1. The accentuation of the crease is marked by making proper markings as a first step. The new crease is elected and marked. It should be oriented slightly outwards and upwards and be of proper length going up to the outer third of the thigh.
2. A wide strip is suctioned above the level of the new crease for approximately 1–2 inches depending on the size of the buttocks.

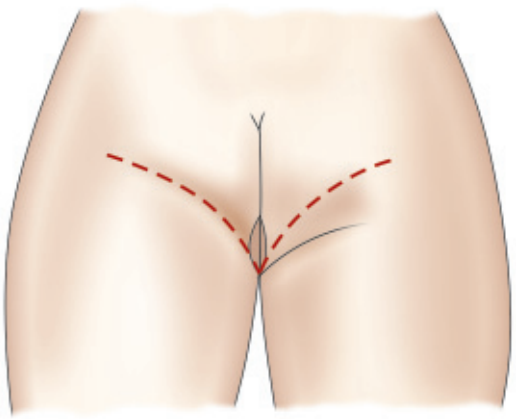


FIGURE 5-12
Upper markings on the right buttock show the new location of the gluteal fold in a patient who had uneven folds

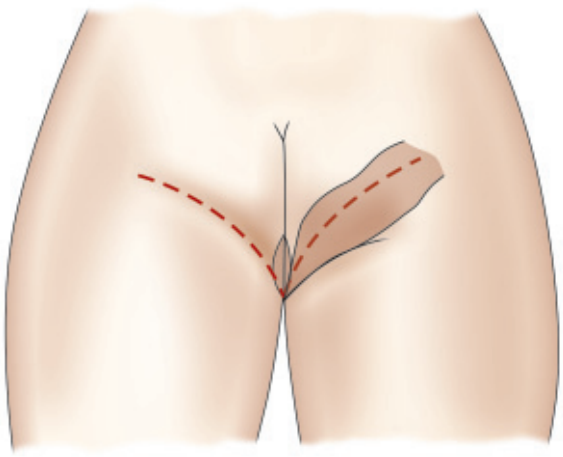


FIGURE 5-13
Liposuction in the area of the new fold is done thoroughly above the old fold and slightly above the new fold

FIGURE 5-15
Typical elastoplast dressing after buttock suction, however, lately garments are preferred for the postoperative care

3. Below the elected crease, a large area is suctioned bearing in mind the shape of the banana which develops below the crease if the upper thigh is not entirely well defatted.
4. At the level of the crease after thorough defatting, the cannula is turned over with the opening up against the epidermis and the skin is scraped of its dermal fat, thus permitting adhesions to form at the level of the new crease **(Figures 5-14 to 5-17)**.

FIGURE 5-16
Markings for infragluteal suction and raising the gluteal crease. The markings represent the level of the new crease and the area of suction needed to obtain it

FIGURE 5-14
After liposuction of the saddlebags and buttocks there may be a difference in the height of the buttocks. Correction is done by suctioning the area above the gluteal fold up to the new fold location. Recently, a new tendency is emerging in the Western young population which is mirrored by prevalent magazine exposure showing flat buttocks without any gluteal crease. During buttock liposuction, attempts have been made to attain that goal to avoid the most lateral area of the upper thigh and at its junction with the buttocks

FIGURES 5-17A AND B
(A) Preoperative 26-year-old woman who underwent saddlebag and buttock suction elsewhere ending up with asymmetrical buttock fold; (B) Postoperative result after raising the right gluteal crease

TABLE 5-1

Buttock liposuction complications

Problems:
❖ Uneven level
❖ Double buttock
❖ "Banana"
❖ Irregular gluteal fold
❖ Dents, depressions
❖ Long gluteal fold
To avoid them:
Even work with careful suction and appreciation of the suction by observation and pinch test

Buttock Liposuction Complications

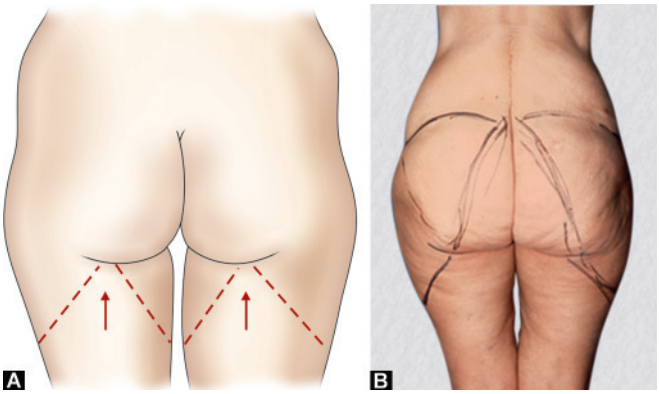
Besides the general health complications consisting of shock, bleeding, infection, hematomas, seromas and esthetic difficulties no other specific complications except for have been encountered. The author has seen some large ecchymoses which have resolved spontaneously **(Figures 5-18A and B)**.

The main complications following the surgery are as follows **(Table 5-1)**:

- Flat buttocks (especially if the Bermuda triangle has been suctioned out and has not been avoided).
- Asymmetry in shape of the buttock and the buttock folds with folds not pleasantly made, either too curved or too straight, which is a problem difficult to correct.
- Double fold: The phenomenon of the double fold or so-called "banana" is rather difficult to correct since any removal of fat between the two folds will not always result in correction of the lower fold. The correction of the banana has been so far complete suction of the fat that is present in its underlying surface. The best treatment is usually that of prevention and the author believes that if one leaves a central column of fat in the posterior thigh for support of the buttock, the banana phenomenon will not appear and flatness of the buttock will also be prevented **(Figures 5-19 to 5-28)**.

FIGURES 5-18A AND B

(A) Preoperative 38-year-old woman with extensive lipodystrophy, peau d'orange, cellulite, flabby skin and poor skin tone. Extremely large deposits may require repeated removals with the tumescent technique and at times an autologous blood transfusion to be able to remove a larger amount of fat. Note the extent of markings; (B) Postoperative after one suction lipectomy that yielded 2300 cc of fat and blood mixture. No blood was given. She returned for a second suction which was satisfactory



FIGURES 5-19A AND B

Treatment of the banana secondary to gluteal fold liposuction. An important structure to preserve consists of the "pillars" situated under the buttocks preventing their slide and their flattening. Treatment of the banana secondary to gluteal fold liposuction will have to be performed in an effort to achieve vertical tunnels of suction across the gluteal fold and in view of the fact that too many incisions are prescribed by Giorgio Fisher, the author is using a long 4 mm cannula or a 3 mm cannula introduced from the sacral dimples. The bananas are then suctioned through perpendicular strokes leaving some vertical elements to suspend the thigh and avoid a collapse of the buttocks and a secondary banana appearance

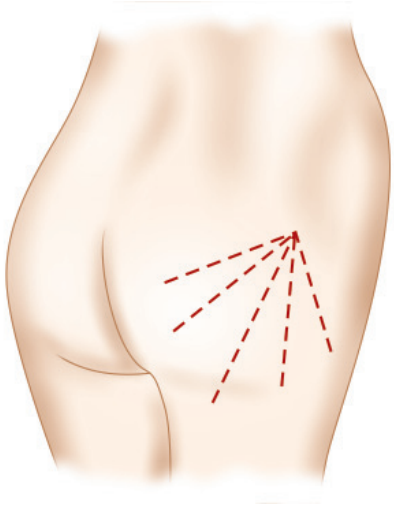


FIGURE 5-21

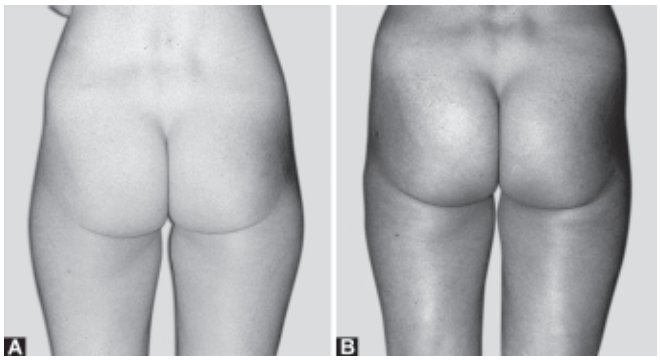
Proper liposuction from the hip to obtain the new buttock shape

FIGURE 5-20

The extent of the liposuction made to allow support of the buttocks preventing the flatness secondary to loss of the thigh pillars. The tip of the triangle should be wide enough to provide a good cushion

FIGURE 5-22

Buttocks showing the ideal new shape indicating the lack of subgluteal groove



FIGURES 5-23A AND B

(A) Preoperative 29-year-old woman; (B) Postoperative following saddlebag and buttock liposuction

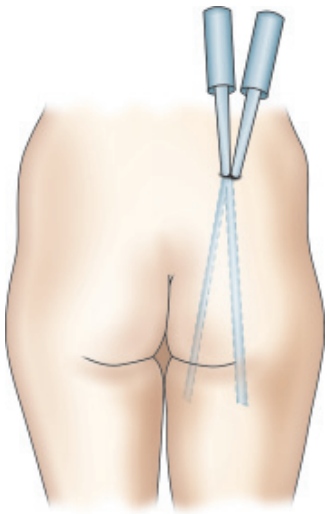


FIGURE 5-24

The treatment of the banana secondary to gluteal fold liposuction can be added from a sacral incision to go across the fold and reduce the banana size

FIGURE 5-25

A patient who underwent liposuction and who is still left with bilateral small "bananas" and multiple areas of dimples due to cellulite

FIGURE 5-26

Patient has had liposuction and is left with multiple dents, irregularities with the banana protuberance and an uneven removal of the saddlebags

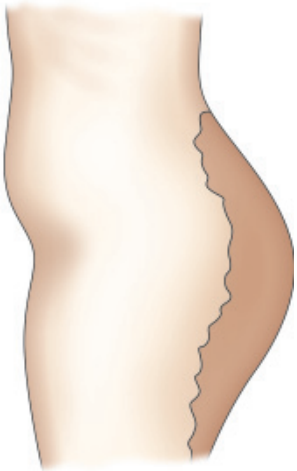


FIGURE 5-27

Expected result to be obtained after the reduction of the buttocks

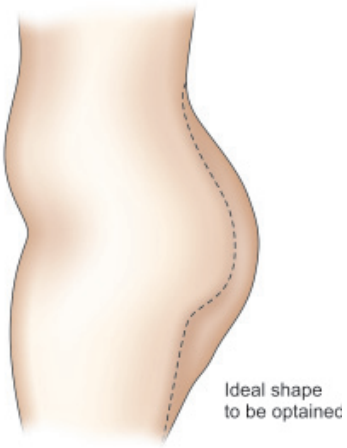


FIGURE 5-28

Areas of suction in order to reduce the anteroposterior protrusion of the buttocks

6 Suction Lipectomy of the Thighs

Adrien E Aiache

ABSTRACT

The thighs are an important area of esthetic concern for women. Liposuction of the thighs is indicated for the deformities mentioned above which have overdeveloped thighs and thighs that are overdeveloped in a limited area such as the anterior portion, lateral portion or the medial portion. Liposuction of the thighs is contraindicated in older females presented with redundant, irregular, cascading skin. The results for these cases would be far from acceptable, although with superficial liposuction a moderate improvement can be obtained. The indications, technique and possible complications are discussed.

General Principles

Thigh liposuction is often associated with trochanteric suction. The large thighs can be protuberant, especially anteriorly where they create a special type of deformity, and posteriorly, especially located in the infragluteal area, and often, of course, in the medial part of the thighs which is going to be represented after that. The treatment consists of liposuction although in some cases it has to be associated with an excision of the inner thighs if the skin is in excess. Anteriorly and laterally, no incision has been found necessary. The operation can correct the actual deformity and can improve the appearance and the thickness of the thigh, especially in cases of "thunder thighs", and liposuction has really improved the treatment of these areas. The actual deformity consists of an extensive development of the fat in the anterior, medial and posterior aspect of the thigh, which can be treated with liposuction **(Figures 6-1A to C)**. The deformity starts in the area immediately below the buttocks and anterior in the groin and ends up just before the knee deformity. This can be improved and often improvement of the knee suction is necessary to continue to improve the appearance of the thighs themselves **(Figures 6-1 and 6-2)**.

Indications

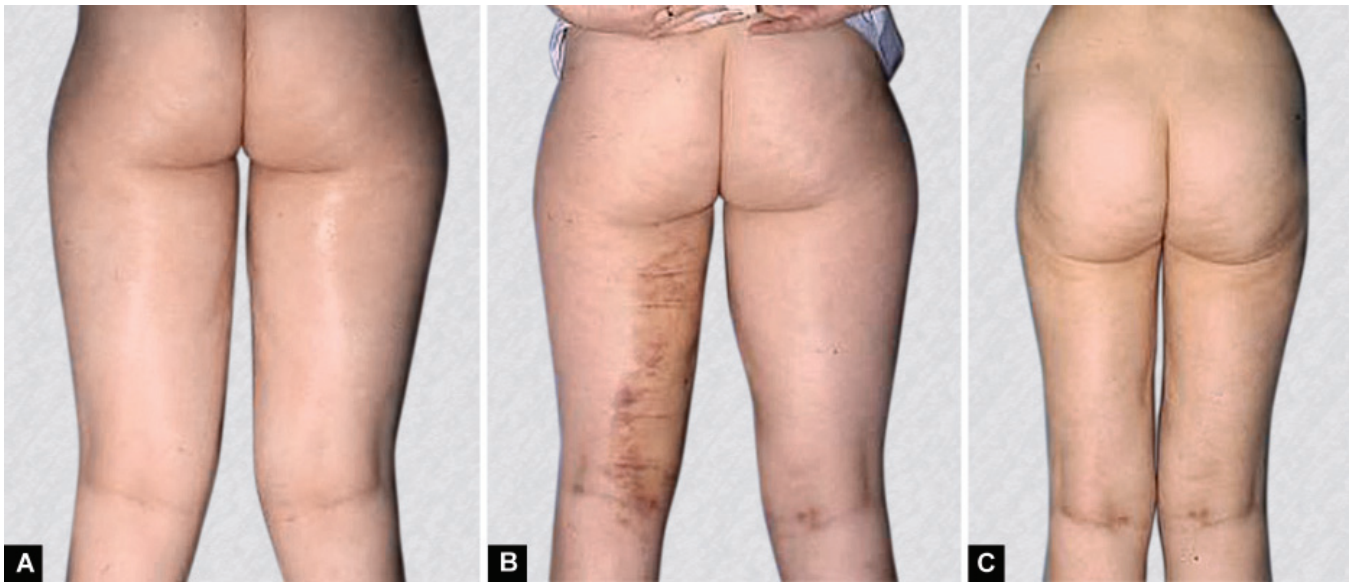
People who have large thighs and often patients who have narrow pelvises develop large legs and thighs, and they want this area to be improved.

Contraindications

Only in cases where the thighs are extremely developed and a problem could occur if patients have excess skin and overlapping of the thighs, which is a rare problem.

Age

Any age is possible in these patients up to the age where a patient can be done safely if their cardiovascular system is stable.



FIGURES 6-1A TO C

(A) Preoperative 42-year-old woman with generalized overdevelopment of the thighs. Large thighs can be reduced by performing circumferential suction in a single operation or in multiple stages if the extraction should exceed 3000 grams; (B) Extensive bruising of the inner left thigh showing the extent of the liposuction for reducing the whole inner thigh; (C) Six months postoperative after liposuction on the lateral, medial, anterior and posterior thighs in four consecutive procedures under local anesthesia

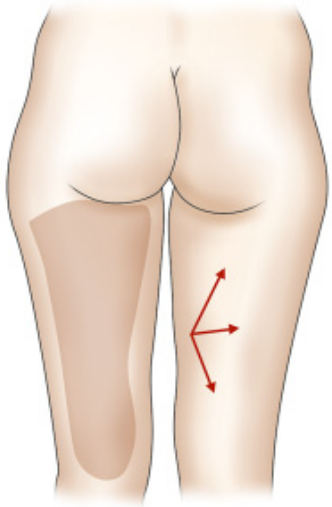


FIGURE 6-2

Markings show the extent of liposuction needed to accomplish reduction in posterior thigh volume

Markings

Patients are marked while standing and very often segments can be performed since there is a large removal of fat in these areas and no excess fat removal should be performed for fear of losing blood and fluid to an extent that is difficult to contain by the anesthesiologist **(Figures 6-3 to 6-8)**.

FIGURES 6-3A AND B

(A) Marking for anterior and lateral thigh liposuction; (B) Two years postoperative

Anesthesia

General anesthesia is most often used and complemented by a solution of diluted xylocaine with epinephrine for bloodless surgery in a solution called either superwet or

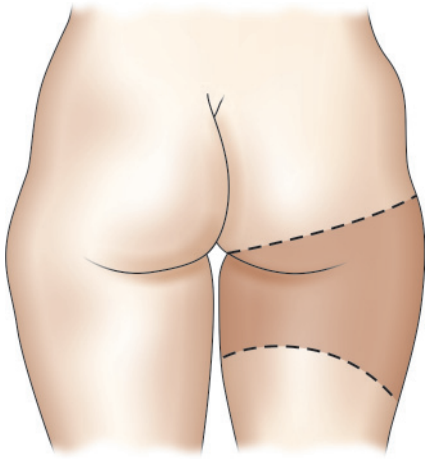


FIGURE 6-4
Markings showing extent of liposuction need to accomplish a significant reduction in medial, posterior and lateral thigh volume

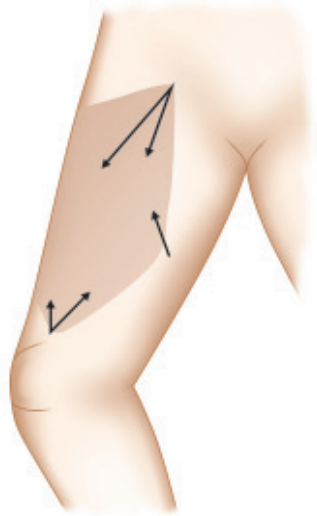


FIGURE 6-6
Superficial liposuction technique through an inguinal incision. This allows anterior thigh liposuction and tightening of the anterior thigh skin

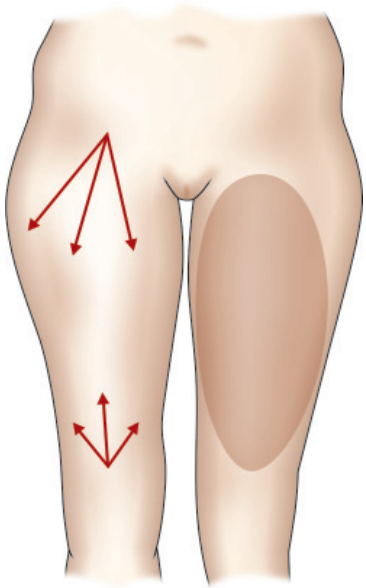


FIGURE 6-5
Anterior thighs: The reduction of the anterior thigh will contribute to an overall reduction in thigh circumference enhancing its appearance. Incisions are made in the groin and above the patella

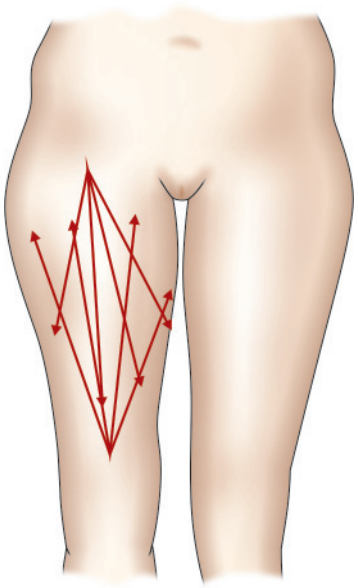
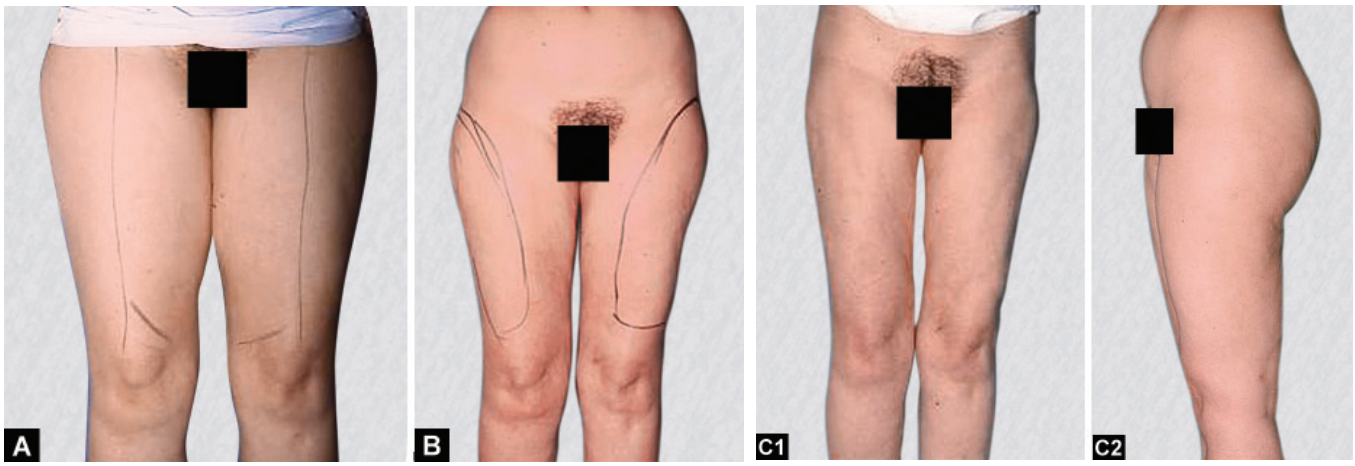


FIGURE 6-7
Crisscrossing of the anterior thigh in order to obtain a smooth even surface



FIGURES 6-8A TO C

(A) Preoperative patient with excessively large anterior thighs; (B) Following reduction of anterior thigh; (C) After further liposuction

tumescent anesthesia. The usual dilution of 0.1% xylocaine with epinephrine 1:1,000,000 can be used as a tumescent infiltration.

Prepping and Draping

After the patient has been anesthetized, draping is done leaving the entire legs free, prepping the feet, and the perianal and vaginal area for proper sterile technique.

Technique and Instruments

The 4 mm and 3 mm cannulas are used for the procedure. The smaller cannulas are used for feathering and for superficial suction for control of the suction. The suction is accomplished leaving a blanket of fat approximately 1–2 cm of thickness, especially in the medial area where the skin is thinner and in the lateral area where the fascia is ending up in the midthigh area. Crisscrossing is always performed as usual and at completion of the procedure feathering is performed to complete the surgery. Closure is performed with 5-0 nylon or 4-0 chromic sutures which are removed in approximately 1 week's time **(Figures 6-9 to 6-11)**.

Discussion

Liposuction of the thigh has proven to be an effective treatment of a deformity that was uncorrectable in the past. Morbidity is low and postoperative complications are minimal.

Complications

Possible complications are listed in **Table 6-1**.

TABLE 6-1

Possible complications

Anterior thighs:
❖ Depressions
❖ Insufficient removal
❖ Bumps
Inner thighs:
❖ Irregular skin
❖ Adhesions and distortions
❖ Excess skin flabbiness means irregular results
Lateral thighs:
❖ Depressions
❖ Insufficient removal
❖ Bumps

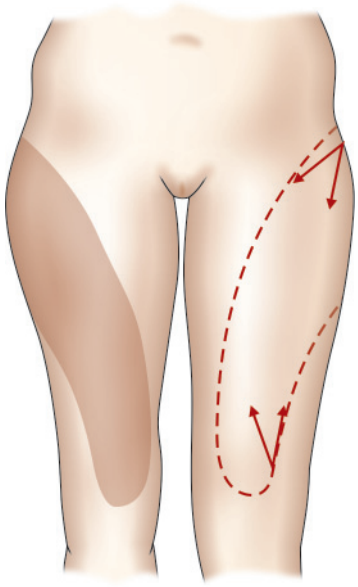


FIGURE 6-9
Combination of anterior thigh liposuction and saddlebag liposuction done through different incisions

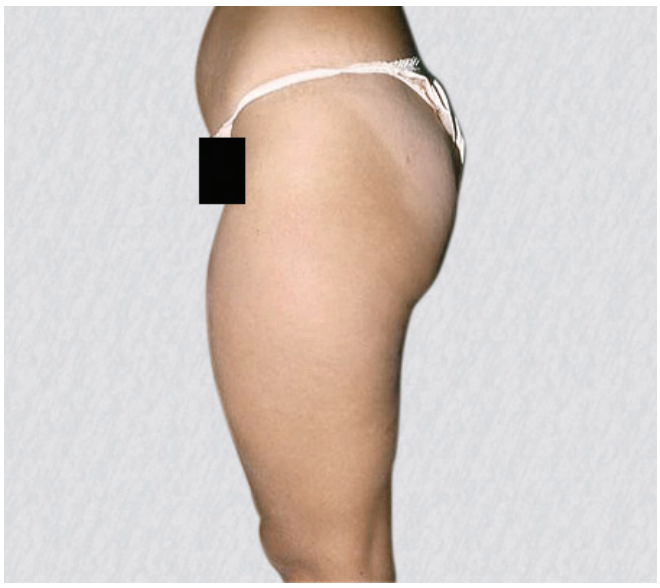


FIGURE 6-10
Typical appearance of anterior thigh lipodystrophy with anterior convexity

FIGURE 6-11
A 28-year-old woman with anterior fatty deposits

7 Liposuction of the Inner Thighs

Adrien E Aiache

ABSTRACT

Treatment of the inner thighs by liposuction can bring a considerable improvement to the esthetic appearance of the female body. Before the advent of suction, the only treatment consisted of large trochanteric excisions leaving excessive scarring going from the inner anterior aspect of the thigh until the inner posterior aspect. Indications include patients who are simply obese with the inner thigh excess as a part of their general obesity which includes the outer thighs, the whole leg and thigh as well as the whole body, patients having difficulties with touching thighs due to narrow pelvis and due to this configuration the slightest amount of obesity in the inner thighs creates a nuisance, and patients with modest fat excess consisting only of a soft and flabby texture in the inner thighs which are touching. The patients should be forewarned of the very real possibility of creating dents and depressions.

General Principles

Treatment of the inner thighs by liposuction can bring considerable improvement to the esthetic appearance of the female body **(Figure 7-1)**. Before the advent of suction, the only treatment consisted of large trochanteric excisions leaving excessive scarring going from the inner anterior aspect of the thigh until the inner posterior aspect. Liposuction has brought a great advance in this field.

FIGURE 7-1
Markings showing the inner thigh approach for suction of the medial thigh

Indications

Several types of patients are good candidates for this procedure. Firstly, patients who are simply obese with the inner thigh excess as a part of their general obesity which

includes the outer thighs and the whole leg and thigh as well as the whole body. In some cases, the excess of inner thigh development is such that it prevents patients from walking properly so that they have to walk with the legs abducted, a difficult and awkward task. The second types of patients, for this liposuction, are built in such a way as to have difficulties with touching thighs. These patients have narrow pelvises and due to the configuration, the slightest amount of obesity in the inner thighs creates a nuisance. The third case is of a modest excess consisting only of a soft and flabby texture in the inner thighs which are touching. These patients will often require treatment only from an esthetic point of view. This deformity is the most common.

A special characteristic of inner thigh fat is the deep softness making it easy to extract by liposuction. Also, note that the skin of the inner upper thigh is often soft and very flabby. These two factors mean that the operator will have to be extremely cautious to prevent large depressed areas.

Caveats

The patients should be forewarned of the very real possibility of creating dents and depressions.

Markings

The patient will be marked in the standing position and in the lying down position. In the standing position, the patient will be standing with her knees touching so the amount of fat excess and "thigh kissing" can be noted properly, marking the upper part of the excess as well as the lower aspect. This should be corroborated by positioning the patient with the legs abducted, then marking again the excess from the upper to the lower part especially delineating the amount to be removed, bearing in mind the fact that a smooth transition should be obtained at the junction of the excess with normal areas.

The patient should be marked in the lying down position with the legs abducted and lying on the side. This will exactly indicate the lateral and medial aspect to be extracted as well as the amount of hanging skin when the patient has her legs outstretched while she is lying on one side **(Figures 7-2 to 7-7)**.

The topographic map can be drawn with the pinch test, a helpful tool in determining the amount of fat to be removed.

The fat thickness will be variable depending on the case. This should be taken into consideration before starting the procedure. The pinch test is used as described.

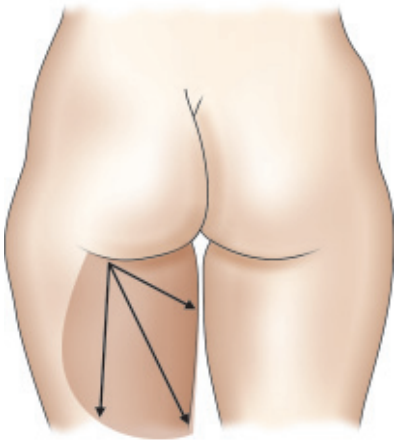


FIGURE 7-2

Posterior approach infragluteal incision, inner thighs: Particularly easy to extract is the fat from the medial thigh area. One, however, has to persist using multiple strokes until the result is visibly achieved. 4 mm and 2 mm cannulas are used and the depth of suction must be controlled at all times. The remaining fat later should be thinner than the posterior or lateral thigh

FIGURE 7-3

Prone position used for inner thigh suction in conjunction with saddlebag and knee liposuction from a medial inner thigh incision

In addition, it is performed in the adjacent tissues in order to estimate the difference with the areas of excess.

Incisions

The incisions can be located in the inner part of the groin and a more convenient location is the lower third of the thigh or in cases where lateral thigh suction is done, the medial part of the infragluteal crease. These multiple approaches allow the crisscross technique **(Figures 7-8 to 7-12)**.

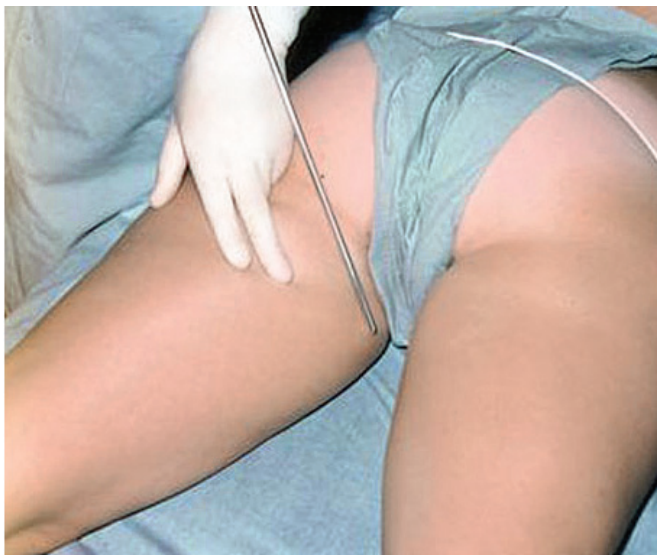


FIGURE 7-4
Inner thigh liposuction through an inferior gluteal fold

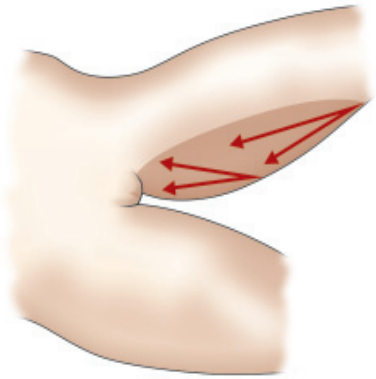


FIGURE 7-6
Proper measurement of the inner excess is done with the patients lying on their side. The elevated leg allows judgment of the skin flaccidly and redundancy

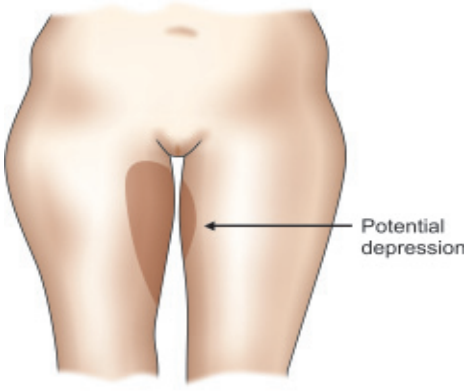


FIGURE 7-5
Contrary to previous opinions, this area must be done superficially with a small caliber cannula for best results

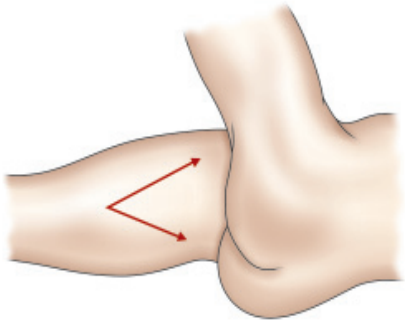


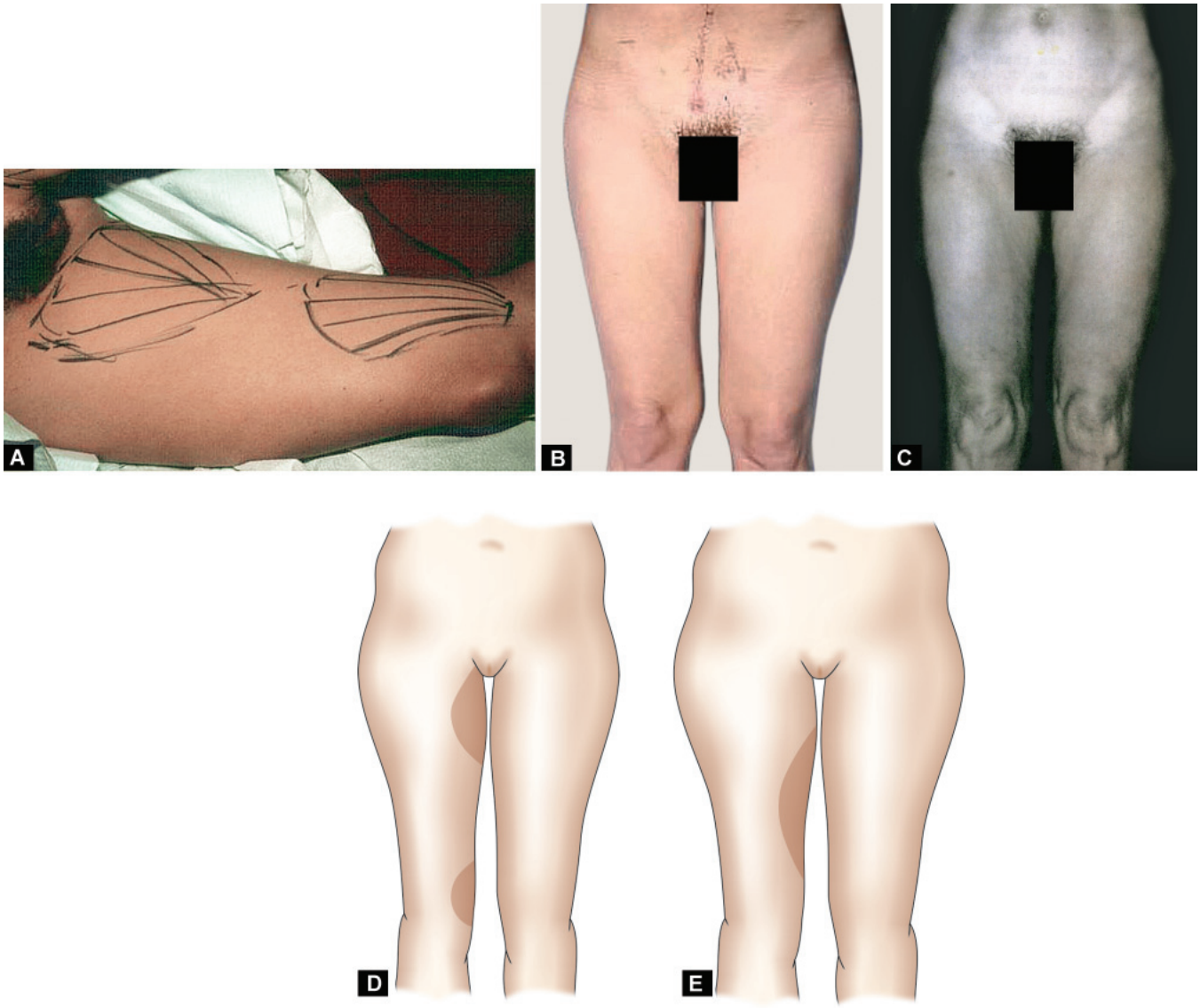
FIGURE 7-7
Surgery is often performed in the same position on the lower thigh while the upper thigh is folded anteriorly for a proper approach

Anesthesia

General anesthesia is preferred for most cases although in some cases, local anesthesia could be useful. The local anesthesia formula is the same as for the other cases.

Prepping and Draping

The patient is placed in the supine position if other procedures are also to be done and the inner thigh suction is performed from the lower third incision. In cases where liposuction is utilized for the saddlebags, the prone position will also be adequate. Cases under local anesthesia are convenient since the patient can be moved around to the prone, supine and lateral decubitus position with the legs stretched up allowing suction of the whole inner aspect of the thighs under direct vision. The 4 mm incision is made and the cannula is introduced from all these areas described. The suction is done in the usual fashion using multiple strokes in each tunnel area and repeating the maneuver until a full thinning out of the zone is done. Another useful technique is to apply the palm to the skin and suction under the palm. If an area cannot be completely defatted, the skin is pinched and it is held as a "sausage" to allow the cannula to penetrate between the fingers. In cases under local anesthesia, multiple changes



FIGURES 7-8A TO E: INNER THIGH LIPOSUCTION

(A) Preoperative markings. In some cases there is an absence of mid medial thigh fat although the upper and lower fat areas are overdeveloped. Liposuction should not include the mid portion otherwise it could lead to a bowed-leg appearance. Two incisions are made with the intent of sparing the midthird; (B) A few weeks previously she underwent an abdominal liposuction with vertical scar revision; (C) One year postoperative after inner thigh and knee liposuction; (D) Areas that were treated with liposuction; (E) After upper and lower thigh liposuction, the medial part of the inner thigh is avoided. It might eventually need suction too since it may present an unsightly bulge

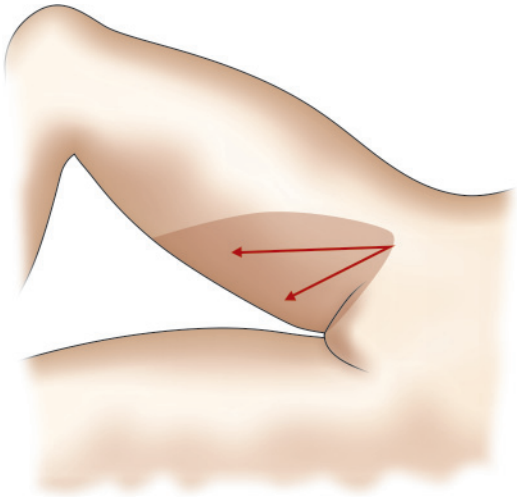


FIGURE 7-9
Anterior inner thigh suction can be accomplished through a groin incision on the patient supine

FIGURE 7-11
The patient is positioned in the lateral decubitus with the upper leg stretched-out anteriorly to allow a proper approach to the inner thigh of the opposite leg

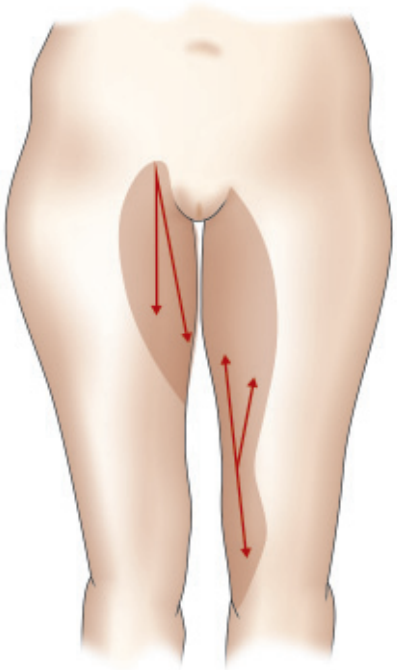
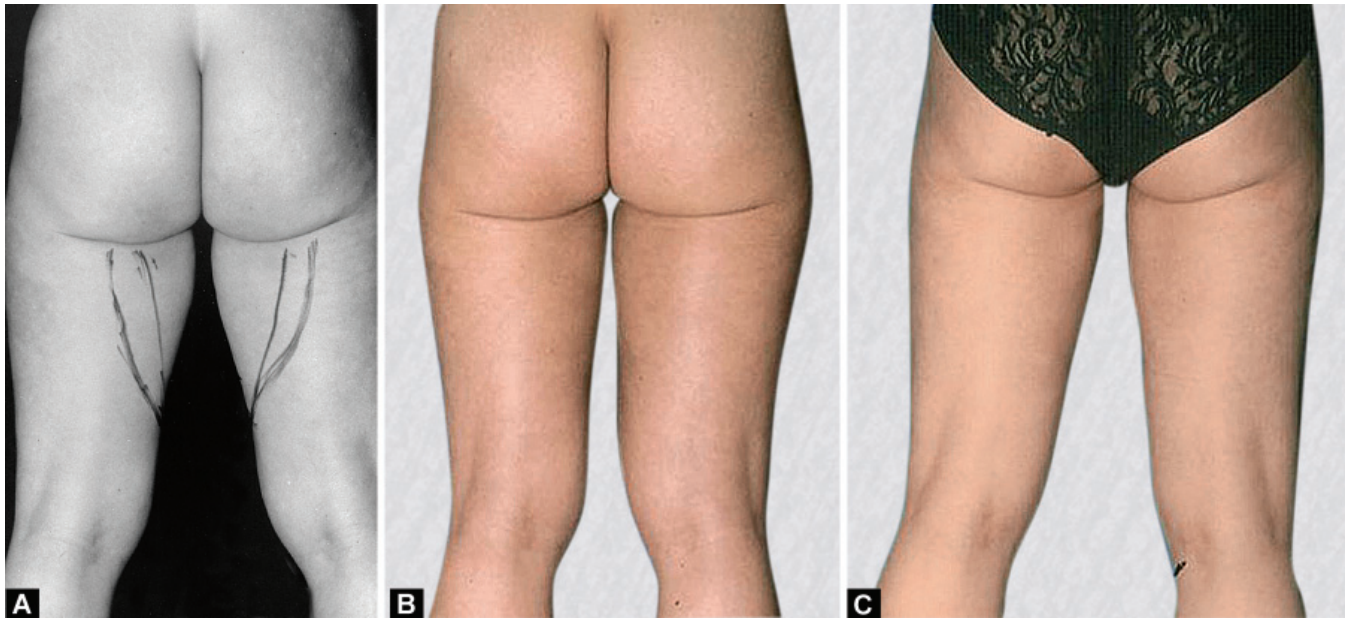


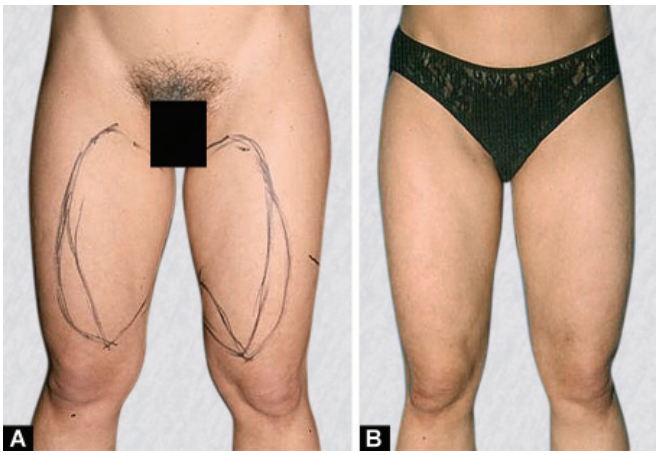
FIGURE 7-10
Anterior thigh liposuction can be combined with an inferior thigh approach that is useful for knee liposuction as well

FIGURE 7-12
Different positioning of the legs for inner thigh suction



FIGURES 7-13A TO C

(A) Markings showing the area of liposuction and the feathering for inner thighs; (B) Six months postoperative; (C) One year postoperative. These results improve in time if the patient does not gain weight



FIGURES 7-14A AND B

(A) Extensive area of liposuction will allow reduction of the whole inner thigh from the groin to the knee. The outer line indicates the area of feathering. Also notice the two anterior incision points near the groin and on the anterior inner knee above the patella; (B) One year postoperative after she also underwent suction lipectomy of the knees

in the position of the patient will help in achieving a comfortable result **(Figures 7-13 and 7-14)**.

Refinements

Feathering the areas anterior, posterior and inferior to the zone that is suctioned is performed with low suction and without suction to allow a good junction with the non-liposuctioned tissues. The multiple positions of the leg and thigh will allow visualizations of the results and the touchup necessary to obtain a smooth junction and contour. The result is checked by observation, palpation and use of the pinch test as for any case of liposuction.

Closure, Dressings and Postoperative Care

Suturing using 4-0 plain catgut and Steri-strips is done and the garments are applied for proper suspension and coaptation of the skin. Postoperatively, antibiotics are given prophylactically as well as pain medication. The strips are changed two days after surgery and then after 1 week.

Discussion

Treatments for inner thigh excess are a great progress in the treatment of unsightly fatty deposits. In the past, large excisions of skin with fat excision were necessary. At this point, only in cases of extreme redundancy and flabbiness of the inner thigh skin can these surgeries be performed again. The treatment with liposuction alone presents fewer complications than other techniques and few problems are encountered as well as few revisions which were necessary at times.

8 Combination of Techniques: Liposuction with Trochanteric Lipectomy

Adrien E Aiache

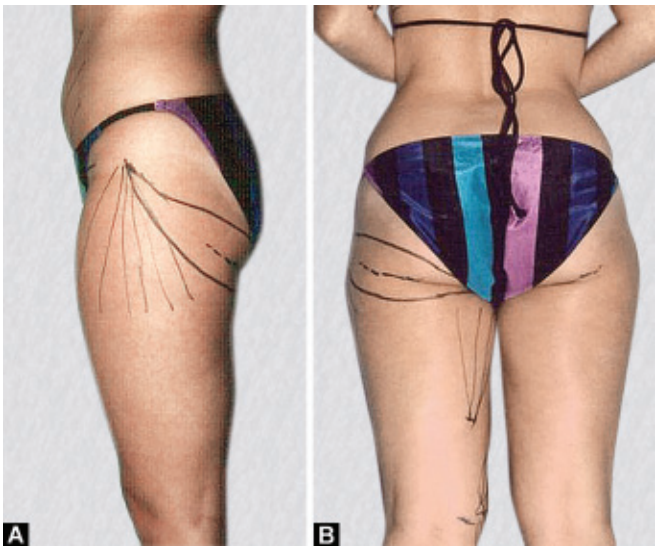
ABSTRACT

The shape of the buttocks, hips and thighs, and the quality of the skin of these areas depends on ethnic background, obesity and age as well as past pregnancies. These factors often result in excessive development of the hips, buttocks and thighs. The treatment in the past consisted of large excisions of crescents of skin from the lower part of the buttock to the upper part of the thigh and from the iliac crest to the inner buttock area. These large excisions resulted in complete removal of the offending excesses, however, the scars from these techniques were usually extensive. The size of the buttocks and the saddlebags can be markedly reduced with liposuction and the deformities can be improved. Some cases require a combination of procedures with liposuction and excisions. Trochanteric lipectomy, liposuction and inner thigh liposuction combined with dermatocrurolipectomy are discussed in this chapter.

General Principles/Introduction

The shape of the buttocks, hips and thighs, and the quality of the skin of these areas depends on ethnic background, obesity and age as well as past pregnancies.

These factors often results in excessive development of the hips, buttocks and thighs. The treatment in the past consisted of large excisions of crescents of skin from the lower part of the buttock to the upper part of the thigh and from the iliac crest to the inner buttock area. These large excisions resulted in complete removal of the offending excesses, however, the scars from these techniques were usually extensive **(Figures 8-1 to 8-3)**. In addition, the various complications were difficult to treat. The problems were many—scar unevenness, hypertrophy, irregularities of the thighs, widening of the scars with irregular shapes of the buttocks and sometimes even



FIGURES 8-1A AND B

Markings for a combination of saddlebag suction and excision. The solid thick line indicates the skin excision

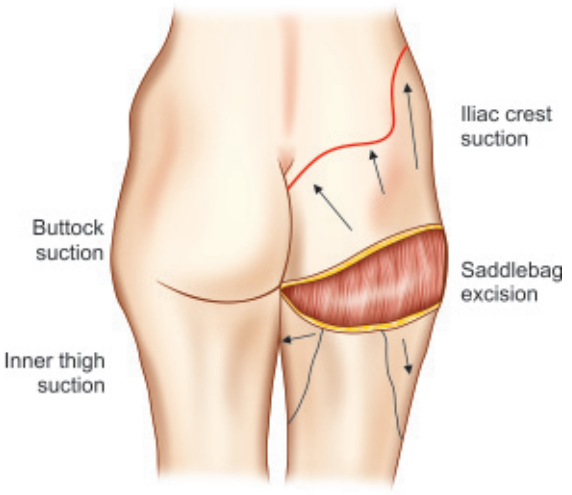


FIGURE 8-2

In combination lipectomy and suction, the liposuction is performed in the areas to be improved then the crescent excision is made

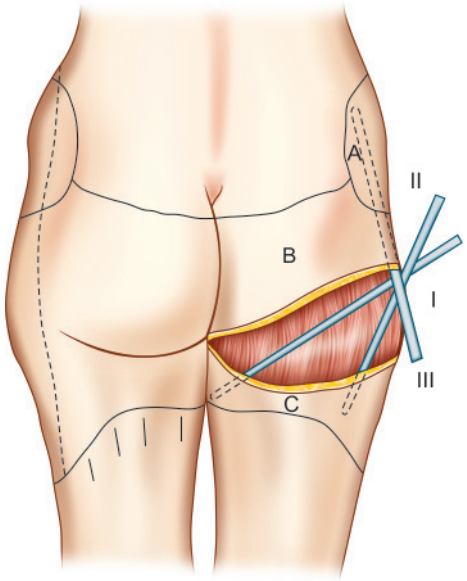


FIGURE 8-3

Saddlebags combination. (Left buttock) Total area of defatting and feathering at the periphery; (Right buttock) Area of excision of skin and fat down to the muscle. II, III: Area of liposuction (A) Iliac crests; (B) Buttock suction; (C) Upper posterior and lateral thigh

recreation of the original deformity (such as the hourglass shape). Other complications included skin slough, sliding of the flaps, seromas, hematomas and wound breakdown. With the liposuction technique, the field has suddenly opened for young women who are now able to achieve their dream of obtaining a shapely silhouette without extensive scarring. The size of the buttocks and the saddlebags can be markedly reduced and the deformities improved.

However, many patients have too much skin sagging, redundant skin, flabbiness or even skin folding. These patients are usually older and have lost weight. In these patients, the return to the large skin excision method is necessary **(Figures 8-4 and 8-5)**.

It is then for these cases that the combination of older techniques with the new technique of liposuction has been offered. It can be given to patients where one has been unable to achieve good results without the excisions or unable to achieve some reducing of the fat areas without suction.

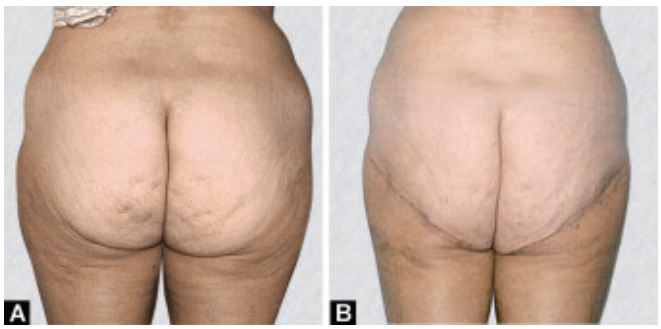
Trochanteric Lipectomy and Liposuction

Indications

Good candidates for the combined techniques are those who cannot be treated by liposuction alone and who would benefit from trochanteric lipectomy. These are usually patients who have a certain degree of localized obesity around the hips, upper thighs, inner thighs and, in addition, patients who do not have enough skin turgor and tonus.

A second group is the patients who have lost weight, who do not have excess fat but a large amount of flabbiness.

Finally, the patients with a very large amount of fat with excesses of the hips, buttocks and thighs might benefit from the combined treatment if the surgeon



FIGURES 8-4A AND B

(A) Preoperative 54-year-old woman admitted for combination procedures with saddlebag excision, buttock liposuction and iliac crest liposuction; (B) Six months postoperative results showing the extensive scars caused by the excision. Even when liposuction is performed, the so-called "violin deformity" can recur. One has to be careful in planning the removal of fat in the vicinity of the lipectomy scars to avoid this deformity

FIGURES 8-5A AND B

(A) Preoperative 52-year-old woman; (B) One year postoperatively after saddlebag excision with liposuction and lift of the inner thighs

knows that liposuction will end up with extremely flabby tissues.

Caveats

Patients should be forewarned of the usual difficulties associated with suction lipectomy and trochanteric lipectomy such as irregularities, waving, over-removal or under removal in addition to excessive scarring, seromas, hematomas, infection and even widening of the scar.

Markings and Preoperative Medications

Markings are made on the erect patient. The markings indicate the areas to be suctioned out at the periphery of the ellipse for proper tightening of the tissues. The ellipse marking indicates the exact amount of tissue to be excised according to the surgeon's estimate. The marking will be extended laterally to delineate an additional triangular excision starting at the groin and going down to the superior third of the thigh if necessary. In addition, markings indicate the areas of feathering at the periphery of the excision and defatting.

Location of Incisions for Liposuction

The incisions are marked anywhere along the line of ellipse excision in addition to the line in the anterior thigh, if necessary. The second incision for crisscrossing sometimes will consist of a sacral dimple area incision for proper defatting of the lower buttock area before closure.

Anesthesia

General anesthesia is the only way to carry out this process and treat these patients. Only minor revisions can be performed with local anesthesia.

Prepping, Draping and Surgical Technique

The patient is prepped and draped in the routine manner in the prone position. First the suction lipectomy is performed from any incision along the lines of the ellipse excision. The suction is performed in the usual manner and crisscrossing is done from other vantage points in order to obtain a smooth removal above and below the zone of excision. It is performed with a 4 mm cannula and a 3 mm cannula for finessing. After the suction is done, excision of a large crescent of skin is performed. The skin is incised down to the gluteus muscle leaving no undermined skin and leaving a certain amount of fat on each of the flaps in order to reapproximate the flaps in a smooth even fashion avoiding inversion or depression of the scar.

Closure

Once all areas have been excised, closure of the superficial fascial system (SFS) is performed in layers using 2-0 vicryl sutures followed by subcuticular closure of 3-0 or 4-0 vicryl. Often no skin closure is necessary and tape is applied in the area. The closure usually does not leave any dead space below it so that rarely a drain will be necessary.

Postoperative Care

The patient is discharged and sent in lateral decubitus position or prone position to avoid pressure on the wounds. They are allowed to ambulate as soon as physically able.

Discussion

Combining liposuction with trochanteric lipectomy has proven useful in cases that lie at the limit at each respective technique. The problems associated with these techniques are the usual ones associated with lipectomy. The liposuction has given a new tool to the treatment of these deformities without adding much to the morbidity. Although the technique leaves extensive scarring, it has found to be the only treatment available in certain difficult deformities. Since the conventional surgery of trochanteric lipectomy has been followed in the past by severe problems, the acceptance of this new combination of techniques is still low and the percentage of patients operated with this method is still relatively small.

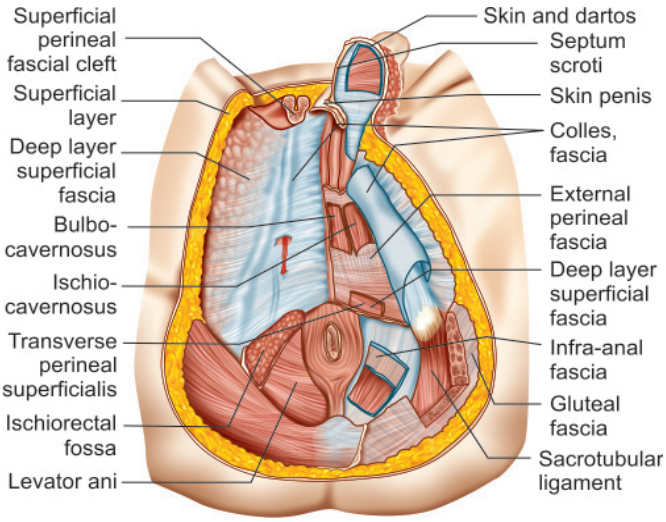


FIGURE 8-6

Anatomy of the perineum showing Colles' fascia and its relation to the inner thigh muscles. (*Source:* Reproduced with permission from Gray's Anatomy, 30th edition. Philadelphia: Lea & Febiger; 1985. p. 503)

Inner Thigh Liposuction Combined with Dermatocrurolipectomy

The technique of dermatocrurolipectomy has been improved since the work of surgeons on the subject has helped in reducing the scars which were always a problem. Better anchoring techniques of the skin are the main reason for the improvements.

The shape and configuration of the inner thighs depend on many factors including obesity, ethnic characteristics and variation in the looseness of the skin. This ends up in relaxation of the skin to a "nonreturn stage". One of the most important factors is age itself, although inner thighs can be redundant and flabby early in life **(Figures 8-6 to 8-9)**.

Because the skin is soft, pliable, thin and hairless, it seems to be an area of early redundancy and ptosis. The treatment in the past consisted of large excisions of skin excess with skin closure.

Many modifications have been made by authors, such as Lockwood, who have attempted to prevent the early recurrences and problems of inferior migration of the scar. Although these scars are inevitable, they were in the past too conspicuous to gain wide acceptance by the female population. This conspicuousness of the scar was

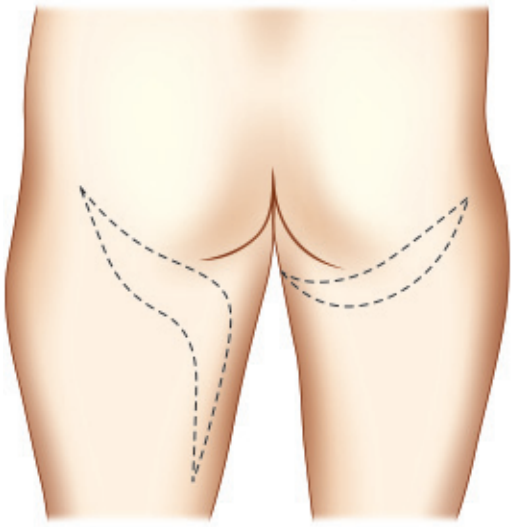


FIGURE 8-7

The trochanteric and thigh lipectomy as per J Lewis performed in the past

due to the tension effected by leg gravity in addition to the fatty excess tugging the skin down giving a widened, hypertrophied, discolored scar migrated below the line of bathing suits in addition to a tight pull over the vulva popping the vulva open. The combination of suction with this new technique of suturing the flap has improved the postoperative appearance. In addition, the secondary effects of real tightening of the inner thighs in removing the stigma of "old- age cellulite" with crumpled, cascading

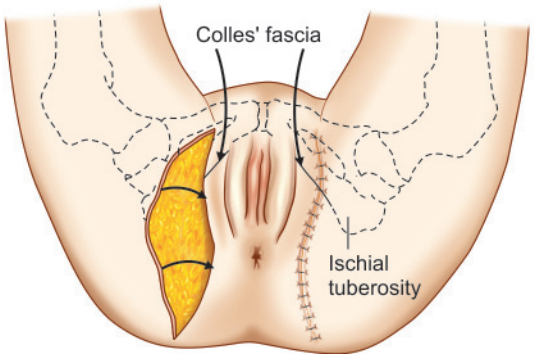
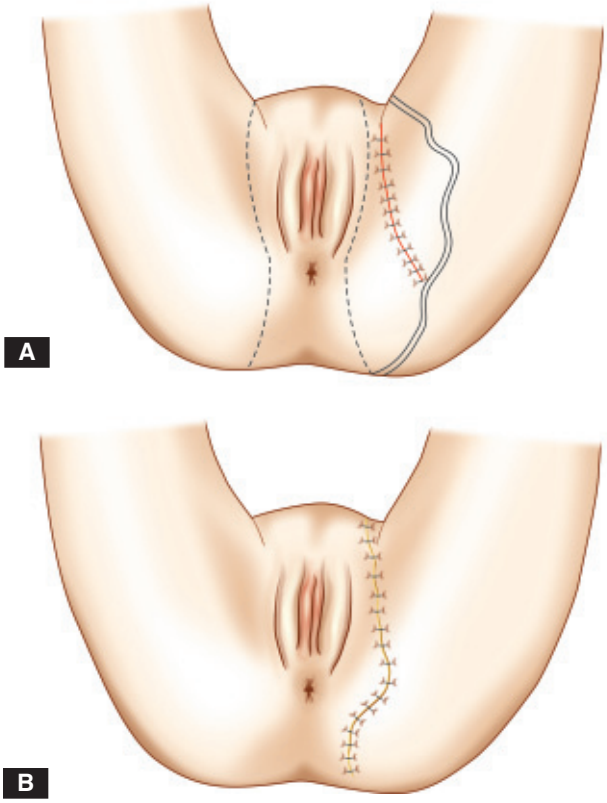


FIGURE 8-8

Dermatocrurolipectomy performed in addition to suction lipectomy. On the left the excision of the skin ellipse is performed from the anterior groin area along the ischial tuberosity and posteriorly into the gluteal fold. On the right, showing the scar resulting from this type of excision



FIGURES 8-9A AND B

Stages of the dermatocrurolipectomy: (A) Incision going from the groin to the crural crease and the ischial area and, on the left side of the patient, undermining and excision of the lower skin flap with identification of Colles' fascia; (B) Closure of the skin and dermis with fixation to Colles' fascia

skin has been helpful. The acceptance by older patients unwilling to wear bathing suits in the past has been gratifying.

Indications

Candidates for the dermatocrurolipectomy technique are older women with excess skin and redundancy in addition to fat excess.

Caveats

Patients should be warned about the still present possibility of scar migration and widening as well as the potential for hematomas, seromas and even skin slough with this new technique.

Markings and Preoperative Preparation

Made on the erect patient, the markings first indicate the higher part of the excision. It should start from the midinguinal point anteriorly, stay high in the sulcus and away from the labia majora, and end up approximately in the middle posterior subgluteal fold. The lower part of the excision is placed where the skin excision will be done. This is measured by pulling and pinching on the skin to approximate the skin edges and elect a proper location of the excision **(Figures 8-10A and B)**.

The markings will indicate the area of suction to be performed inferiorly, anteriorly and posteriorly joining in the middle of the thigh. The lower part of the markings should always be taken into consideration during the time of surgery and left until the end of the procedure since it is possible to excise too much skin or too little skin. In very large excisions a small triangle can be made, ending up in a vertical scar posteriorly, which will help in approximating the lateral excesses of the skin. The markings also indicate the area of suction which would be performed either at the beginning or at the end of the excision of the skin.

Anesthesia

General anesthesia is the most common. The patients are usually placed in the prone position allowing the first part of the surgery to be performed. They are then turned over in the supine position to end up with the inner and anterior part of the excision.

Surgery

- The patient is under anesthesia in the prone position. Suction lipectomy of the inner thigh is then performed thoroughly through that inner posterior crease. This step of the procedure is performed with the knowledge that

FIGURES 8-10A AND B

(A) Preoperative 52-year-old woman with lipodystrophy and flabbiness of the inner thighs; (B) Six months postoperative after inner thigh dermatocrurolipectomy

the flap to be excised does not need suction and that the suction itself should be extensive enough to correct the deformity and to allow a relaxation of the inferior flap that will be elevated. It extends as far as the excess of fat has been estimated.

Excision of the posterior part of the ellipse is then started and it encompasses the whole thickness of the inner thigh skin down to the fascia of the pelvic diaphragm. No undermining is done and the lower flap should easily reach the upper flap at the level of Colles fascia.

After surgically cleaning up the area that has been exposed and removing the excess fat tissue, further dissection is done in order to identify Colles fascia; this is accomplished by following the fascia of the adductor and by feeling the inner ramus of the pelvis which is the higher part of the anchorage of the skin.

According to Lockwood, this step is the most important one in order to suture the deep dermis of the lower flap to a stable area of the groin in order to prevent scar descent. The sutures consist of 2-0 PDS and the skin is closed with 3-0 nylon.

- Once the surgery is done posteriorly, the patient is turned over in the supine position, prepped and draped, and the legs are abducted in a frog-leg position and held in stirrups in the gynecological position. This position will allow the completion of the excision of the triangle of skin anteriorly and allow proper suturing to the sulcus area.
- As far as the skin flap itself is concerned, a modification of Lockwood's excision prevents the widening of the pubic hair area. It consists of an angled excision of anterior skin with vertical excision up to the groin itself and horizontal incision at the groin laterally.

Continuation of the ellipse of skin excision is performed down to the fascia of the adductor muscle. The identification of Colles fascia is further performed in the supine position before being able to approximate the lower flap to it.

- Following the excision of skin, undermining is done for 1–2 inches to allow the inner thigh ellipse to be positioned to the fascia of the muscular layers occupying this area. The fat is aspirated over the fascial area for proper identification of the deep fascia in its extension. No major nerves or vessels are present in that area.

The superficial fascia and the dermis of the lower flap are then elevated and sutured to Colles fascia and the ischiopubic area in order to sustain the flap and hold it permanently. This anchoring technique is done with a few strong sutures of 2-0 PDS, then the skin is closed and bandages applied. The bandages should be changed often or done without altogether in view of the maceration possible in these cases of deep sulcus surgery. The patients are allowed to ambulate freely and frequent showering is advised two days after surgery.

- This technique of inner thigh dermatocrurolipectomy can be sometimes combined with suspension techniques for lateral thigh lifts and lateral dermatocrurolipectomies as described originally by Pitanguy. This combination of techniques is often very satisfactory for combined procedure of the inner and posterior thigh.

Conclusion

New approaches in dermatocrurolipectomy have been helpful in preventing recurrences and complications that were seen with older techniques.

9 Liposuction of the Knees

Adrien E Aiache

ABSTRACT

The lower thighs often have areas of accumulated fat which distorts their natural shape and causes a loss of normal contour. In patients who have excess fat deposits, the knees become indistinguishable from the thigh and the S-shape is lost. In older women an accumulation of fat will occur just medial to the medial condyle. The upper area of the calf can also be too fat and again the patient loses normal leg contour. Liposuction can be used to correct the deformities of the knee areas. Bleeding, irregularities (especially around the condyle) and sharp demarcation of the defatted area can be seen. General complications consist of the thromboembolic phenomenon and especially deep venous thrombosis when large zones develop ecchymosis, hematoma and constriction around the knee.

General Principles

Before the liposuction techniques, no specific improvement could be obtained in the shape of the knees, the lower thighs or even the area of the upper calves. A variety of problems in and around the knees can now be successfully treated.

First, the lower thighs often have areas of accumulated fat which distorts their natural shape and causes a loss of normal contour.

In the normal subject the thigh is wider in its upper part and becomes thinner towards the area above the knee. A nice lazy-S curve can be observed in the inner part of the thigh going into the knee and again the same curve can be observed going into the calf. In patients who have excess fat deposits, the knees become indistinguishable from the thigh and the S-shape is lost.

The knees themselves can also be too prominent. This is a common problem in older women where an accumulation of fat will occur just medial to the medial condyle. This accumulation will give a very unesthetic appearance to the knee and is often the subject of a request for correction.

The upper area of the calf can also be too fat and again the patient loses normal leg contour. This fat usually accumulates just below the popliteal area and medially obturating the pleasing curve of the gastrocnemius muscle **(Figures 9-1 to 9-3)**.

Treatment of the anterior knee, although less requested **(Figures 9-4 to 9-6)**, is becoming more common and is available. The problem usually consists of an accumulation of fat in the anterior part of the thigh above the patella hiding the area of the patella giving an ugly appearance to the legs and knees. There is often an excessive amount and the knees themselves are deformed by these fatty deposits.

Contraindications

Elderly patients and patients with circulatory problems are

FIGURE 9-1
Knee liposuction is performed with small caliber cannulas, 3 and 4 mm, through a posterior medial popliteal incision

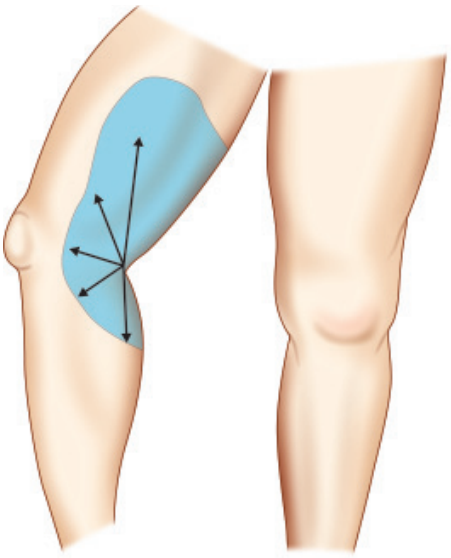


FIGURE 9-3
A wider area in the lower third of the thigh is shown where liposuction should extend anteriorly and posteriorly for a pleasant effect. The upper leg area should be defatted until a gentle curve is obtained giving a good projection to the condyle and the gastrocnemius

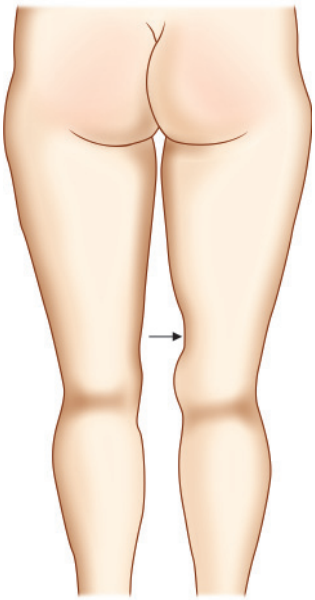


FIGURE 9-2
Careful planning of the extent of liposuction is important to avoid a sudden step at the junction of the inner thigh and the upper knee. The feathering technique is of help in preventing the step deformity. The use of small caliber cannulas will be helpful in feathering the area to be liposuctioned

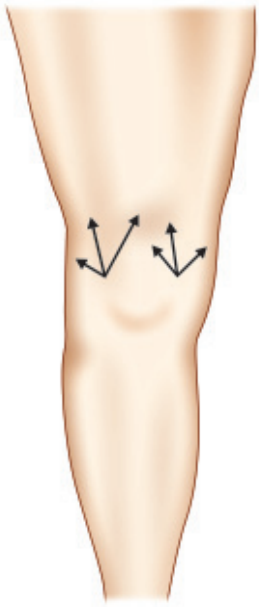


FIGURE 9-4
Anterior incisions for anterior knee liposuction

FIGURE 9-5

Special type of marking for knees and anterior lower thigh liposuction

FIGURE 9-6

Liposuctioning the knee. The liposuction starts from the middle to lower thigh and continues around the condyle to the upper third of the lower leg. A gentle curve should be obtained with these areas liposuctioned out

dangerous to approach since vascular complications may occur such as arterial thrombosis and especially deep vein thrombosis.

Age

Age is not a crucial factor. Patients of almost any age can benefit although, again, the complications can be more prevalent. The skin is, however, conforming very well to these areas.

Caveats

The area to avoid is situated just below the patella. Although the knee can be well-suctioned, the suctioning should be meticulous in order to obtain the desired shape. Avoid going too high towards the thigh and also avoid creating a sharp contrast with the remaining portion of the thigh. The same problem can arise below if the defatting has been too extensive and there is a sharp transition with the calf. The condyle area should be thoroughly suctioned and a good control of the suction should be effective since the author has seen complications from uneven and non-careful suction.

Complications

Bleeding, irregularities (especially around the condyle) and sharp demarcation of the defatted area can be seen. General complications consist of the thromboembolic phenomenon and especially deep venous thrombosis when large zones develop ecchymosis, hematoma and constriction around the knee.

Markings

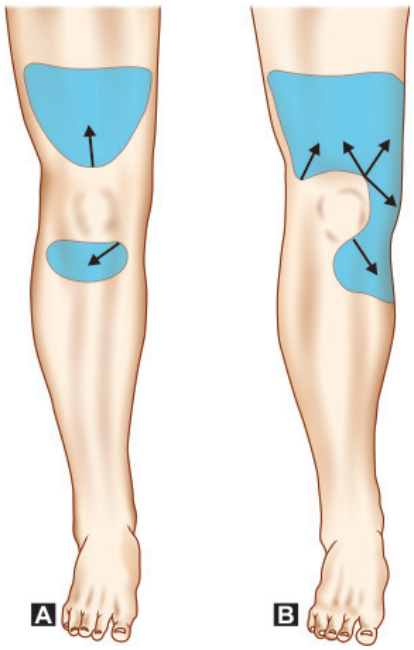
The patient is usually marked in the standing position to assess the esthetic appearance of the leg. The extent of the markings will vary depending on the area to be improved. It can reach the midthigh and extend more posteriorly and anteriorly. The condyles are marked for suction depending on their shape. The markings are different according to each surgeon; however, the author favors the three-lobed shape which consists of a large area of suction in the lower thigh area, tapering and again expanding to encompass the area just below the condyles and above the medial belly of the gastrocnemius.

Location of Incisions

Through a posterior popliteal incision placed medially in the lower thigh the desired liposuction can be accomplished over a fan-shaped area going up as far as the midthigh **(Figures 9-7 to 9-9)**. A lateral incision might be necessary if there is an excess of fat in the lateral aspect of the knee and the lateral aspect of the thigh.

Lastly, an anterior medial patellar incision is done above the patella allowing further suction of the anterior lower thigh above the patella, the areas anterior and medial

FIGURES 9-7A TO D: INCISION SITES FOR KNEE SUCTION
(A) Anterior approach from a fold in the suprapatellar area and in the infrapatellar area; (B) Posterior approach through an inner popliteal fold or an outer popliteal fold incision; (C) Inner knee suction through an inner popliteal fold or an inner infrapatellar incision; (D) An additional incision can be made in the lateral popliteal fold allowing suction of the lateral leg and calf



FIGURES 9-8A AND B: INCISION LOCATION FOR ANTERIOR KNEE LIPOSUCTION
(A) A suprapatellar incision allows suction of the lower anterior thigh. An infrapatellar incision allows suction immediately on top of the patellar bursa; (B) Two superior incisions can be used for the lower and inner thigh, an inferior patellar incision for the medial leg

FIGURE 9-9
Knee liposuction may be performed on the patient in the prone position through a medial popliteal incision

to the patella and inferiorly in a very sensitive area on the tibia situated immediately medial to the patella. This zone is especially important to defat if one wants to obtain an esthetic result.

The upper calves should also be marked for suctioning in two areas. The first is medial to the calf and defatted just below the medial condyle. The area will extend only two or three inches down since the normal curve of the gastrocnemius should be conserved.

The second area is more posterior and the whole area above the gastrocnemius can be defatted. In cases where it is hypertrophic, the defatting can be done through the same medial posterior popliteal incision. This area is tailored to the amount of fat that is required to be removed over the gastrocnemius muscle.

Medial Condyles

The medial condyle can be defatted through the same incision. The procedure is most common in older women where the condyle is covered with a thick layer of fat. The suction can be accomplished as anterior as possible near the patella and defat especially the top area to defat which is situated medial to the patella.

The examination and assessment of fat removal is done in the usual manner using the pinch test and clinical observation. Topographic markings can be made although they are often difficult to follow in the liposuction procedure. The pinch test used properly will allow gradual tailoring of the areas to prevent a sharp demarcation with the nonliposuctioned area **(Figures 9-10 and 9-11)**.

FIGURES 9-10A AND B

(A) Preoperative obese patient. The removal of fat will have to be limited over the condyle in order to prevent an excessive difference with the remaining thigh; (B) Six months postoperative

FIGURES 9-11A AND B

(A) Preoperative 32-year-old woman with condyle lipodystrophy. The protrusion of the condyle giving an "older" appearance to the leg. Note on young patients with beautiful legs, the beginning of distortion that is starting in the condylar area; (B) Three months postoperative

Anesthesia

If this area is done singularly, local anesthesia can be used safely. It again consists of a diluted solution of xylocaine with epinephrine. If the suction is only a part of a larger area of other zones, general anesthesia is preferable. The patient is prone for the original part of the treatment, then supine for the completion of the anterior and medial portion of the knee.

Surgical Technique

The relevant areas are infiltrated with anesthesia before the procedure and then using the popliteal fold medial incision, suction is accomplished using a 4 mm cannula followed by a 3 mm cannula used methodically starting in the lower thigh making multiple fan-shaped strokes going downward to the condyles and then below the condyles in the upper calf area. Tedious working is necessary to accomplish the desired results and obtain a good S-shaped curve to the inner knees. If the anterior and posterior areas of the knee are to be performed, the patient is switched in the supine position, reprepped and draped, and the incision medial to the patella in the fold is used to complete the anterior and medial portion of the knee. As mentioned, the area immediately above the tibial tuberosity is important to defat to obtain a harmonious shape. Despite the original general principle

FIGURE 9-12

In order to obtain and appreciable result, knees should be well-carved. A typical area demarcated by Illouz above the condyle and a lesser area below. Defatting entails the whole surface of the condyle and the groove above and below. A proper marking entails a much more extensive area than the one originally proposed by Illouz

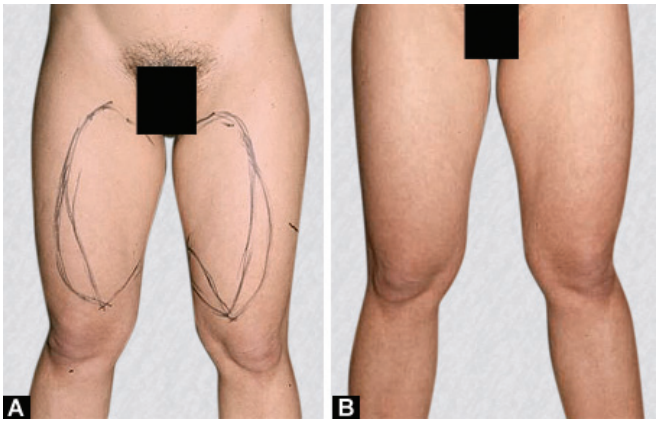
FIGURE 9-13

Condylar liposuction is accomplished through an inner popliteal incision on this patient in the lateral decubitus under local anesthesia

that removal should be conservative, it has been our experience that fat removal in the knee should be as thorough as possible in order to obtain a noticeable result. This zone should be left with a very thin mattress of fat. Anteriorly, a small cannula can be used to refine the defattening **(Figures 9-12 and 9-13)**.

Refinements

Since this area is particularly difficult to shape properly, extreme care must be taken to refine the procedure at its borders and in the actual area of suction. In particular, proper defatting is necessary around the condyles with complete defatting both above and below the condyles to obtain the S-shaped curve. Feathering is necessary in all these areas especially in the middle part of the thigh and especially anteriorly if it is done since there could be a sharp demarcation between the thigh and the portion immediately above the patella **(Figures 9-14A and B)**.



FIGURES 9-14A AND B

(A) Anterior knee liposuction can be accomplished through an anterior incision above the patella using a small cannula (3 mm or 4 mm) and can even go higher on the thigh. The zone of incision is at the lower part of the curve; (B) Six months postoperative

Dressings

Closure of the wound is done with nonabsorbable sutures and the proper garments are then applied immediately.

Postoperative Care

The patient will remain in the recovery room until completely recovered, then discharged with antibiotics and pain medication. The important part of the technique is to prevent tightening around the knee which could block the return of the saphenous vein.

Complications

In the presence of varicose veins some bleeding may be encountered. One must approach this problem with care. Other specific problems are excess redundancy of the skin

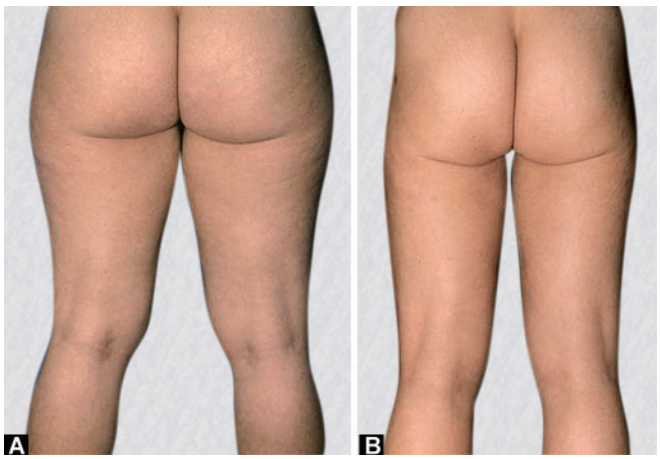
which is only seen above the knee. Thrombophlebitis or infections can occur and should be prevented as much as possible.

Discussion

The liposuction technique has been found useful in the treatment of the knee and areas around it. It is a very satisfactory procedure. It is a positive improvement and is relatively simple to perform with few difficulties **(Figures 9-15 to 9-18)**.

Knees

Depending upon the area worked on, the shape of the knees will be more or less satisfactory if proper sculpturing is not achieved.



FIGURES 9-15A AND B
(A) Preoperative 25-year-old woman with lipodystrophy of the knees; (B) Three months postoperative

FIGURES 9-16A AND B
(A) Preoperative 18-year-old woman with mild knee lipodystrophy limited to the condylar area; (B) Six months postoperative

TABLE 9-1

Complications of knee liposuction

Knees:
❖ Insufficient removal
Unequal
Dents from irregular removal
Depressions
❖ The condyle should be "cleaned" of fat
The upper junction with the thigh should be tapered

An area of dissatisfaction is at the point of junction of the thigh and the calf where either too little or too much has been removed from both areas. The condyle, difficult to correct well, presents cosmetic problems in shape and volume. The complications of knee liposuction are given in **Table 9-1.**

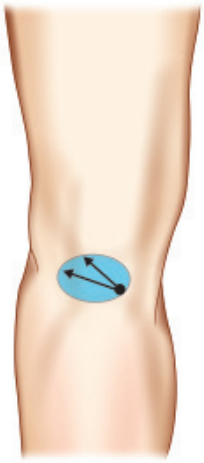


FIGURE 9-17
A difficult area is the bulge below the patella. Although it contains the infrapatellar bursa, this area can successfully be improved by thinning the skin over it since it does, in fact, contain some excess fat

FIGURES 9-18A AND B
(A) Preoperative 52-year-old woman with large knees and inner thigh lipodystrophy; (B) Four months postoperative

10 Abdominal Liposuction

Adrien E Aiache

ABSTRACT

In the past abdominal lipectomies were the treatment of choice for excessively fat abdomen and panniculous. In cases where skin excess is not a major problem and in younger patients liposuction has brought an interesting armamentarium of techniques for reducing the abdominal wall. In cases with large fat deposits and skin excess, the patient should be warned in advance that the appearance of skin excess with fold formation may look worse since the liposuction will remove the fat and leave skin with poor turgor above it. Another warning is that, postpartum stretch marks cannot be erased. Complications consist of hematoma, bruising, pain, irregularities of the skin if the crisscross technique has not been well-used, seroma and hemorrhage (rare). The technique is discussed with possible complications in this chapter.

General Principles

Liposuction of the abdomen is done for patients who have abdominal lipodystrophy. These problems are present in the young as well as in older patients and consist of an excessive deposition of fat in the abdominal wall, occupying the whole abdomen anterior part as well as the flanks and the epigastrium.

Although in the past abdominal lipectomies were the treatment of choice, at this time the surgery consists of limited incisions and complete defatting of the abdominal wall. In cases, where skin excess was not a major problem and in younger patients where there was no alternative, liposuction has brought an interesting armamentarium of techniques for reducing the abdominal wall.

The reserved local fat deposit in the abdomen is located mainly in the lower abdomen where two different levels exist. There is a deep reserved fat and a superficial fat situated between the superficial fascia and the skin. In the epigastrium, these two zones are not easy to distinguish and the whole epigastrium, which is more dense and fibrous, has mainly one layer of fat over the superficial fascia.

Indications

Indications are excellent in feminine gynoid morphic types who present small pot-bellies. Liposuction is less satisfactory when the LFD is larger and extends into the upper abdomen. The liposuction of the abdomen is usually reserved for patients with moderately protruding abdomen and moderate fat deposits. These are patients who would have been rejected for lipectomy in the past. Other acceptable cases are postpartum women left with an abdominal redundancy associated with little or no skin excess. Even in the presence of stretch marks, the procedure can be performed with reasonable success if there is enough excess of fat. Although the stretch marks cannot be removed, the appearance of the abdomen and the surface of the skin will improve.

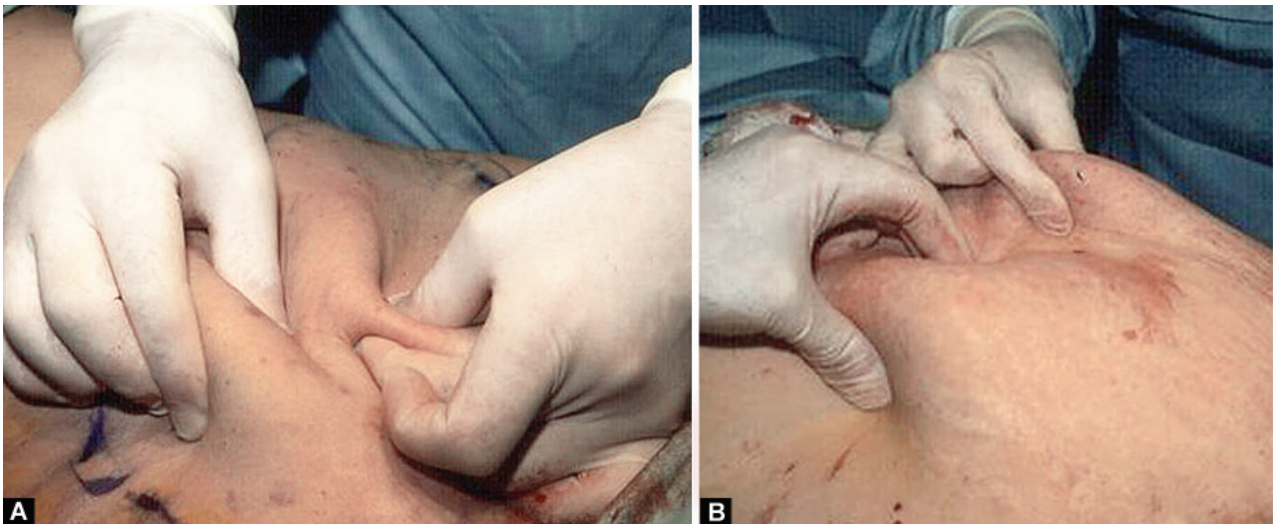
Caveats

In cases with large fat deposits and skin excess, the patient should be warned in advance that the appearance of skin excess with fold formation may look worse since the liposuction will remove the fat and, however, leave skin with poor turgor above it. Another warning is to the postpartum stretch marks patients since they cannot be erased. In cases of skin excess with laxity and very little fat deposits, improvement can only be moderate. One of the additional effect of superficial liposuction is the improvement of the skin laxity since it has been known to help in skin retraction.

Markings

Markings are to be made in the standing and sitting position. This will determine the exact amount of fat to be removed and highlight the areas which are the fattest. This will also delineate the junction with the thinner fat panniculous ascertained with the pinch technique applied all over the abdominal wall. The markings will also delineate the periphery of the area and, in addition to the incisions to be made, the feathering zones **(Figures 10-1 to 10-9)**.

In some cases, the fattest areas are around the umbilicus. Other cases might have some excess in the



FIGURES 10-1A AND B

(A) The "pinch technique" is necessary before, during and after suction to obtain a smooth surface; (B) The rolling pinch helps evaluating the skin thickness

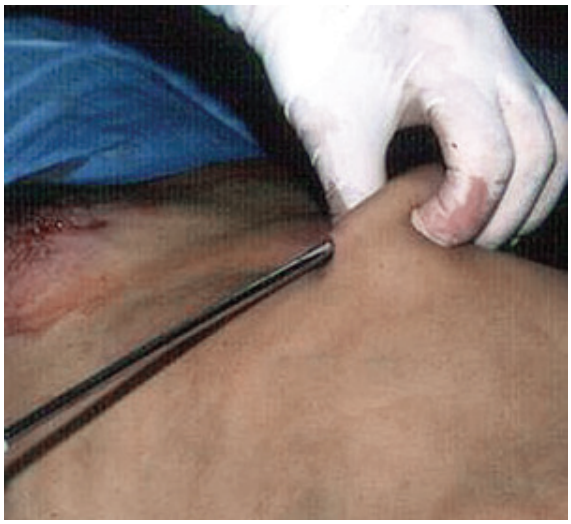


FIGURE 10-2

The cannula is then directed upwards with a light touch to the fascia (the thickness of 1 cm of abdominal roll should be obtained)

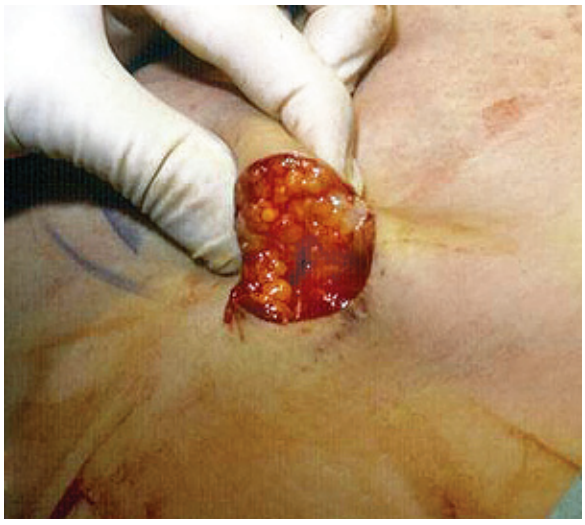


FIGURE 10-3

The actual folding of the pinch test shows the elevation of the fat layer when the wound is open allowing an exact estimate of the fat thickness available for suction

FIGURE 10-4
The flat of the opposite hand controls the skin thickness during the suction

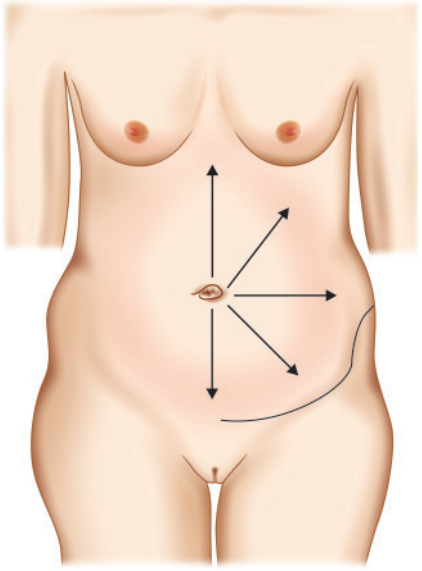


FIGURE 10-6
Abdomen basic liposuction technique. An incision is made in the inferior or superior umbilicus. Suction reaches the xiphoid, goes over the ribs, further out in the waist, down to the pubis and then to the iliac crest

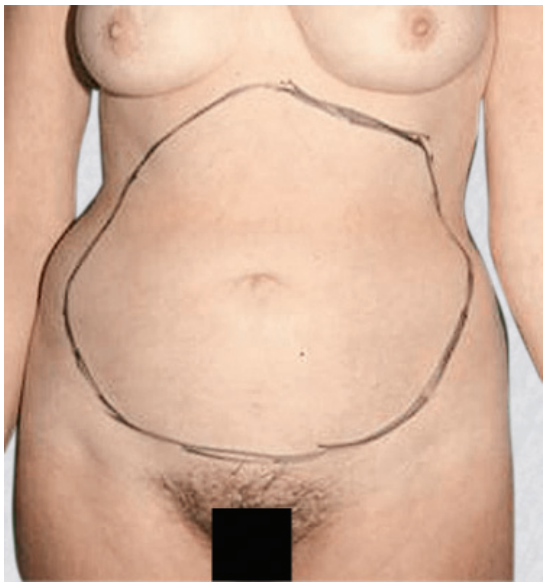


FIGURE 10-5
Typical markings for abdominal liposuction. The stippled area and the thumb line are indicating the zone of feathering

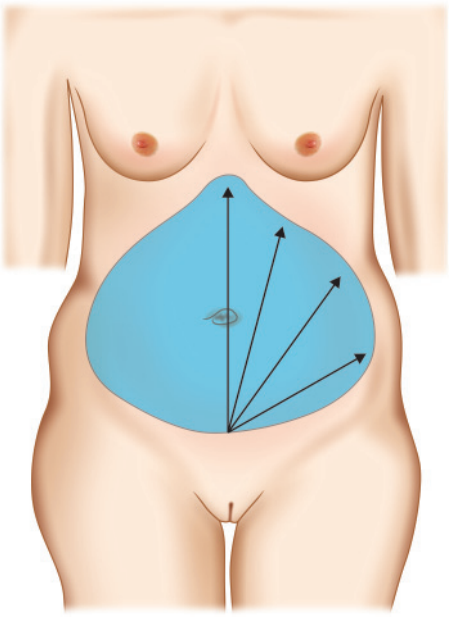
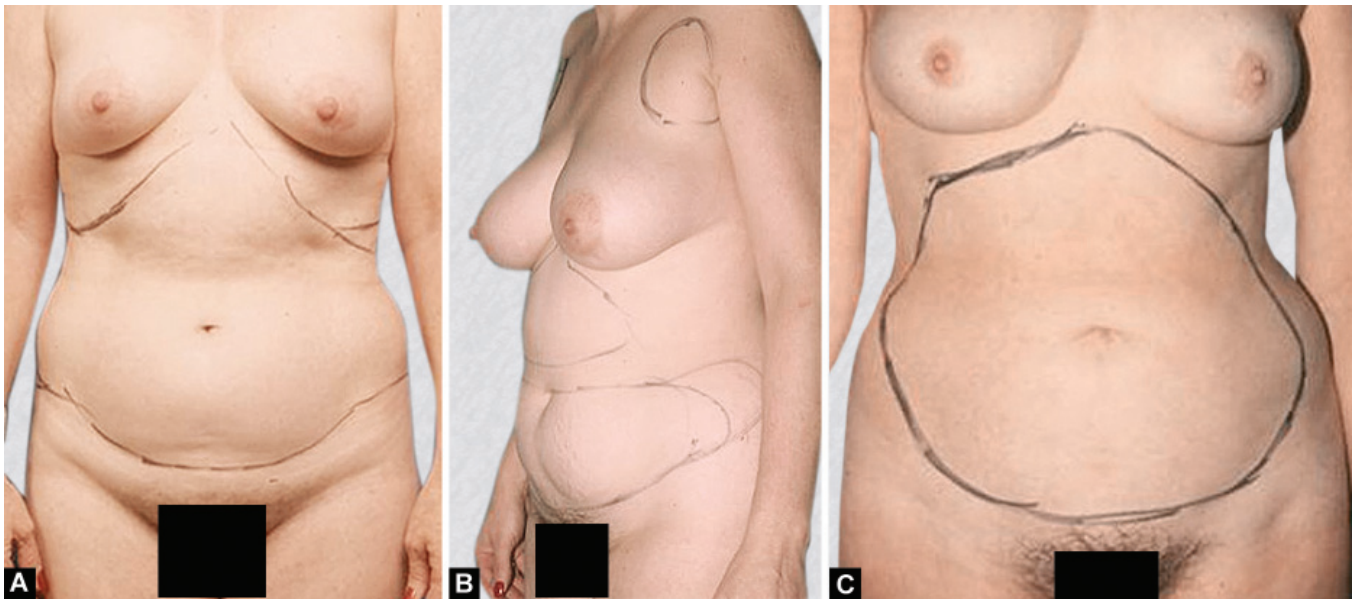


FIGURE 10-7
Another incision is located in the suprapubic area where it is hidden by the pubic hair. It now reaches the epigastrium easily with a 3 or 4 mm cannula



FIGURES 10-8A TO C

Markings made on the patient where the waist suction is unnecessary, however, note the height of the epigastric markings which indicates the patient has excessive fat in this area

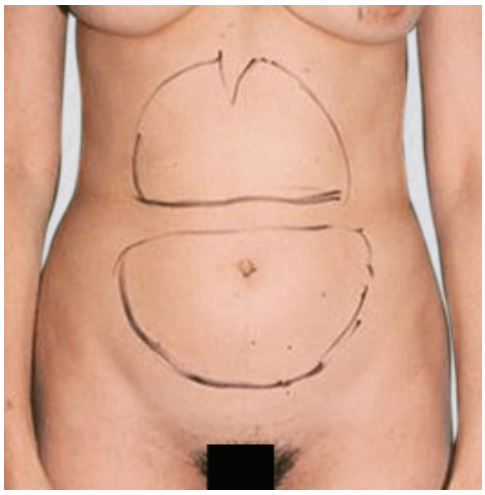


FIGURE 10-9

Markings made on a thin patient who has localized deposits around the umbilicus and the epigastrium. Note, how the waistline is spared in order to prevent "coup de hache" deformity

suprapubic area. These should be marked carefully for proper suction. The precostal area on both sides above the ribs and covering the last three ribs also should be taken into consideration since it has been found often to be protruding after liposuction of the area below it has been done.

The sitting position will be helpful in determining the amount of skin laxity in the areas of the abdomen which are the fattest.

Incisions

An infra- or supraumbilical incision can be performed. The second common incision is in the suprapubic zone. Other incisions can be placed in previous scars of appendectomy, cholecystectomy, or median abdominal scars. The scars can be revised at the same time. One should be careful in suctioning around the scars since it could enter hernias (**Figures 10-10 to 10-15**). The area around the umbilicus is done from the suprapubic area

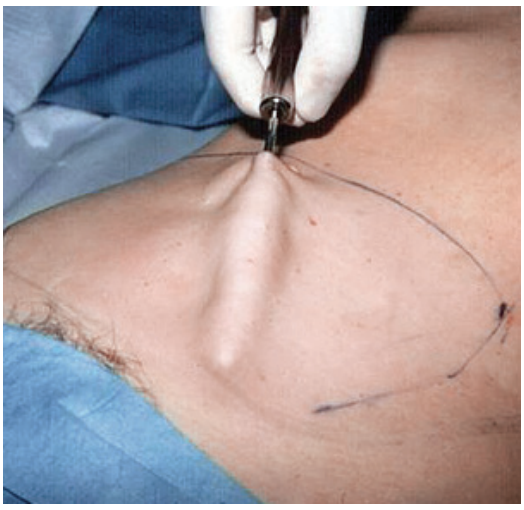


FIGURE 10-10

Liposuction performed from the umbilical incision allows for a complete abdominal suction. The thickness of the skin can be seen over the cannula

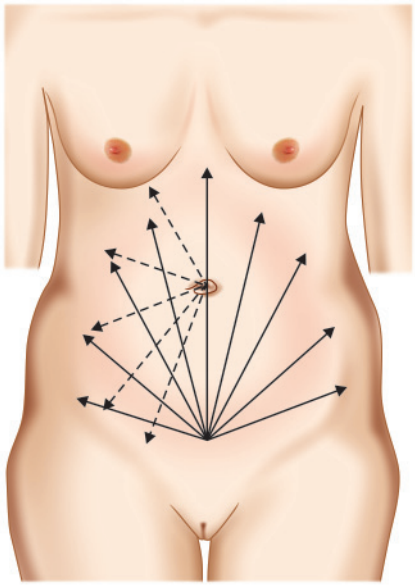


FIGURE 10-11
The crisscross technique allows for a thorough and uniform suction of an area

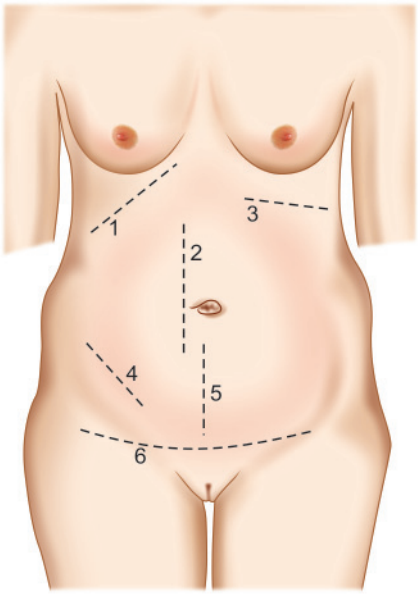


FIGURE 10-12
The incision for liposuction can be performed in a scar from: (1) Cholecystectomy; (2) Median or paramedian laparotomy; (3) Sympathectomy; (4) Appendectomy; (5) Cesarean section, or (6) Gastrectomy. These scars can be revised during the procedure if they are responsible for adhesions or if they are thick or inverted

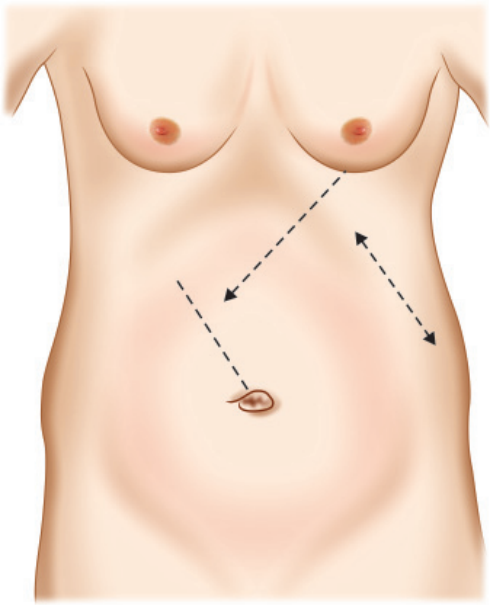
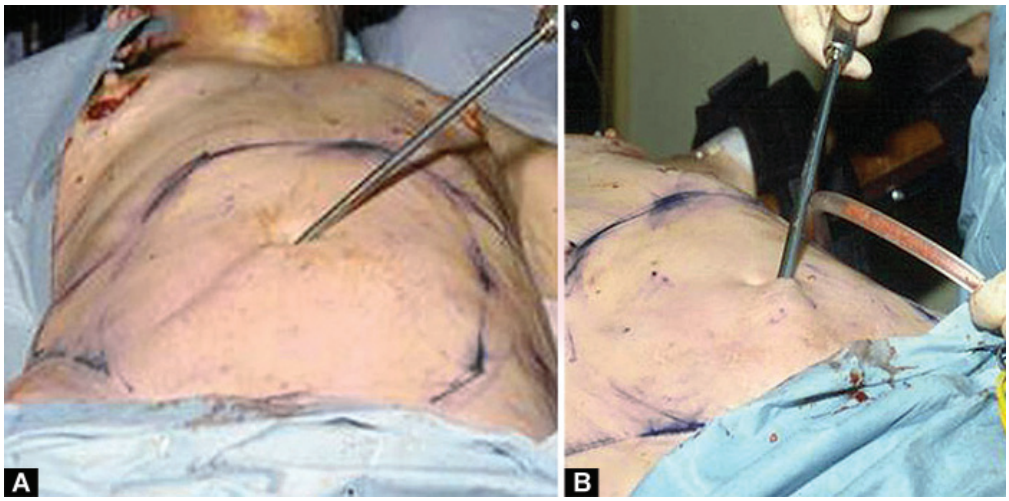


FIGURE 10-13
A submammary incision is useful for epigastrium suction and is less dangerous in avoiding possible perforations of the diaphragm (make sure that the patient is in complete extended supine position)



FIGURES 10-14A AND B
The umbilical incision allows for a circular suction of the upper and lower abdomen

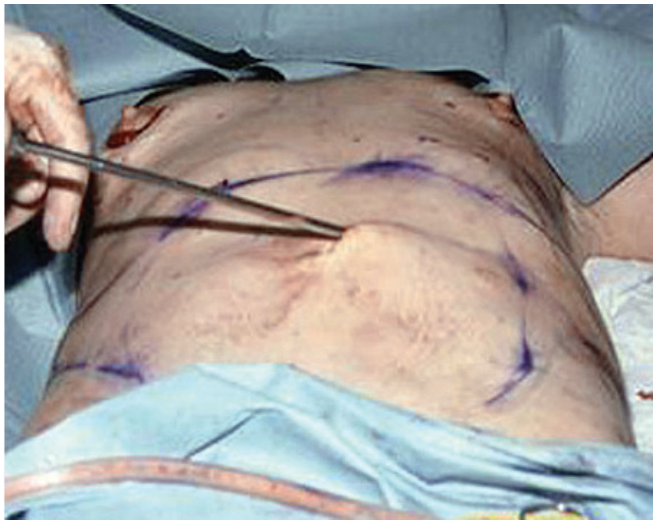


FIGURE 10-15
By approaching the abdomen from the opposite side of the table, lower abdominal suction is easier

and suction is done assiduously until the excess is well-removed and a proper umbilical zone is obtained. The second area of difficulties is below the xyphoid where through the umbilical incision a very assiduous suction should be performed. Since the periumbilical area can be missed during regular suctioning, a cannula with an opening situated 2 inches from the end is used.

Instruments

The 3 mm straight cannula is the most effective. The Concord type is helpful in suctioning out the waist and flank. The 4 mm cannula is useful for finishing up the areas around the umbilicus, xyphoid and the flank. As the surgeon improves and becomes more proficient in the technique, he can use a smaller size cannula to achieve an even surface. The author uses often the Robles cannula for finessing of the zone and proper suctioning in the superficial zones.

Technique

Once the incision has been made either above or below the umbilicus, suction should follow the regular rule of creating parallel tunnels in a spoke-like fashion defatting each tunnel properly before moving to the next one. A good technique is to mark different quadrants from the umbilicus and achieve the liposuction in each of these until it is properly done. A smaller cannula is used to suction the remaining fat areas which are palpated, visualized and grabbed in the palm of the hand. The suction in some areas is done in three steps:

- A larger suction cannula is used on the whole area described while the midline is omitted superiorly and inferiorly.
- In the second stage the 3 mm cannula is used to suction-out the midline up to the xyphoid and down to the pubis. These areas being denser and more interspersed with connective tissue respond better to smaller cannulas.
- The 3 mm is used to finesse the areas, which is the final stage. A longer cannula without suction can be used for the elevation of the tissues.

Positioning

The patient is in the supine position. The operator being one-handed introduces the cannula from either side of the

abdomen for easier control. The pinch test should be performed all along the procedure in order to obtain a uniform thickness of approximately 1 cm. The suction starts in the lower level and ends up in a more superficial one. In areas of junction with nonsuctioned areas, care should be taken to avoid depressions.

Anesthesia

Because the abdominal wall is extensive and local anesthesia is often very painful, general anesthesia is most often necessary. The operation is then started with the tumescent infiltration from the zones of incision and then suction is performed. In a limited number of cases, in thin patients, a small extent of liposuction is necessary and local anesthesia can be used.

Prepping and Draping

It is routine for the abdominal wall and draping is done from the nipples down to the midthigh. At the end of the procedure the patient is set in the setting up position to assess the appearance of the skin after suction.

Closure

Closure is done with absorbable sutures, Steri-strips applied and the patient is set in a garment **(Figure 10-16).**

FIGURE 10-16
Elastoplast is applied across the abdominal wall horizontally. This technique of dressing is now abandoned in favor of immediate garment application

Postoperative Care

The patients return home after they are awake and they are started on prophylactic antibiotics and pain medication. The patient is then changed at 2 days for evaluation of the areas and seen a week later. Exercises and massages are advised 8 days after surgery.

Intra-abdominal Lipodystrophy

Intra-abdominal excess due to omental excess and mesenteric fat combined with weak and flabby abdominal muscles is a problem in cases if one is to achieve a satisfactory result in abdominal suction. The epigastrium gives poor results because it is enmeshed in connective tissue and fibro-fatty tissue as opposed to the lower abdominal wall which has a layer of soft fatty tissue. The excess of volume in abdominal organs and the omental fat gives the so-called beer belly which is difficult to improve in view of the fact that this large abdomen will not improve considerably due this inside fat.

The treatment which consists of liposuction is not giving the same optimal results as normal anatomical cases and the patient will be disappointed. It has been thought that possibly some reduction in the omental fat could improve the so-called beer belly, however, no surgery has been performed to that effect at this point **(Figures 10-17 to 10-22).**

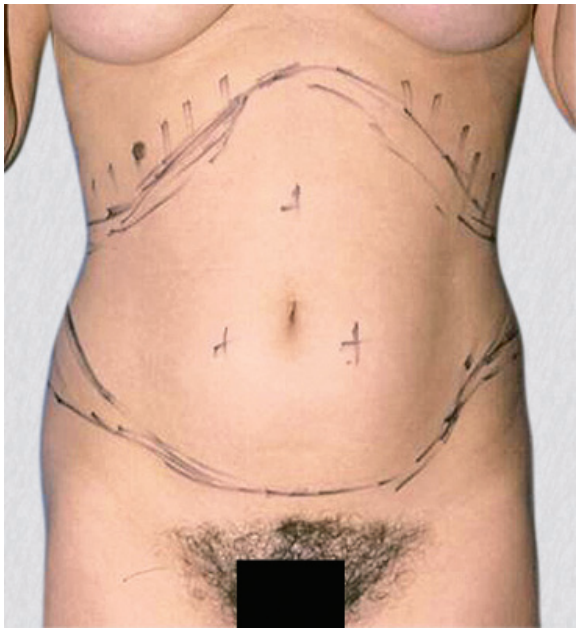
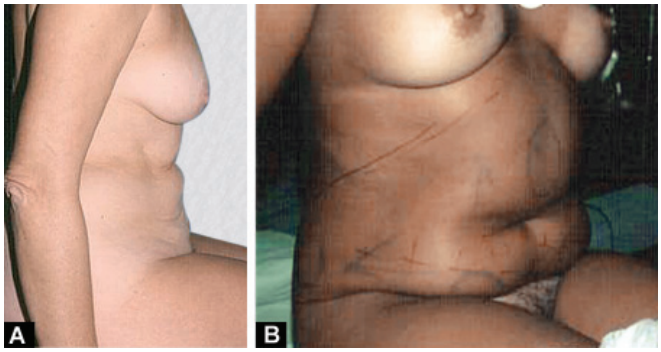


FIGURE 10-17
Actual markings showing extension to the waist and feathering in the lower rib cage area



FIGURES 10-18A AND B

The sitting position is often more demonstrative of excess fat in the abdominal wall

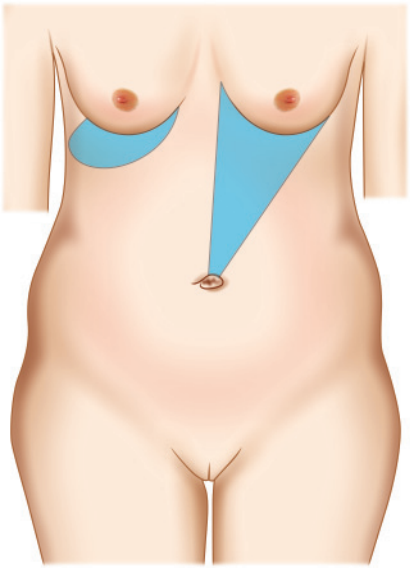


FIGURE 10-19

The liposuction process when performed through an umbilical incision directed at removing the heavy fat layer often present above and below the rib cage

Discussion

This liposuction of the abdomen is a satisfactory technique for reducing the protrusion of the abdominal wall **(Figures 10-23 to 10-33)**.

Complications

Complications consist of hematoma, bruising and pain with irregularities of the skin if the crisscross technique has not been well-used. Irregularities consist of dents instead of excess fatty lobules. They could be present since the entry into the level of fat situated between the skin and the superficial aponeurosis is unforgiving.

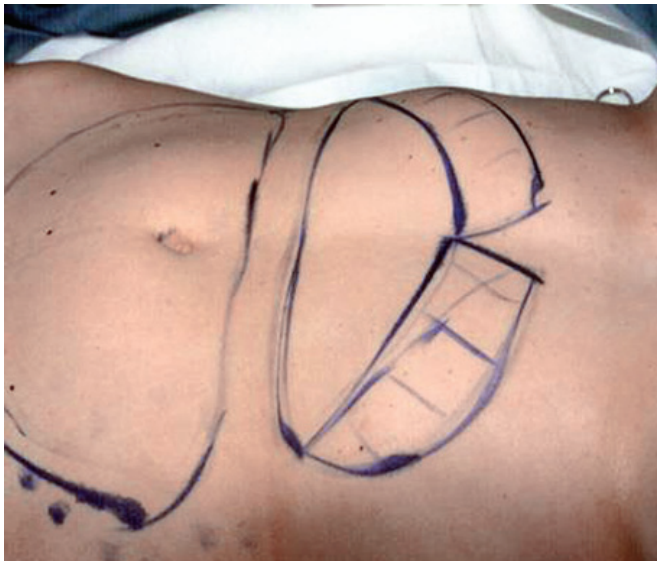


FIGURE 10-20

Abdominal liposuction is difficult in the infracostal area. Extremely cautious and persistent suction should be performed. Any lack of precision and evenness will result in an irregular abdomen especially in older patients. Younger patients who have a taut skin will show fewer irregularities

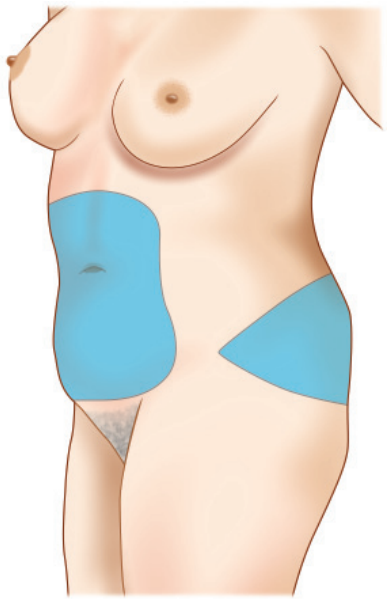


FIGURE 10-21

Markings of a different shape: Thickness of the waist area is preserved while most of the excess fat of the abdomen and iliac crests is removed

Hemorrhages are extremely rare, however, seromas can be seen and they are treated by either draining or routine tapping.

In more extensive cases, liposuction of the abdomen will be complemented by skin excision.

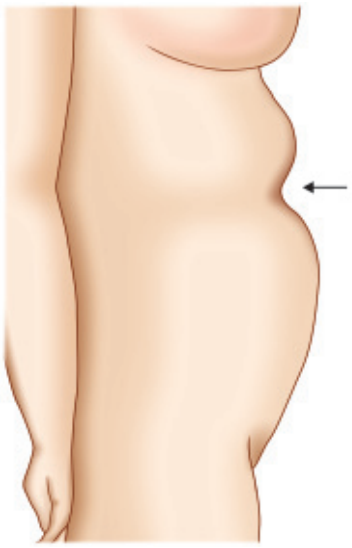


FIGURE 10-22
The anterior waist should be dealt with carefully. Excess removal of fat may result in a deep groove or may show insufficient removal. In patients with some waist skin relaxation due to age, a conservative suction is advised ("coup de hache" deformity)

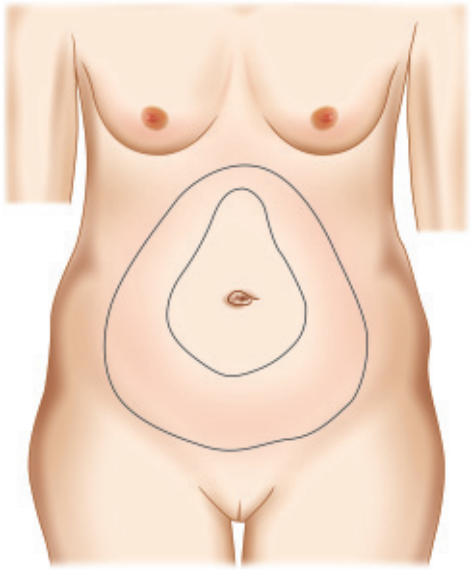


FIGURE 10-23
Wrong design showing only suction in the central part of the abdomen and missing the waist

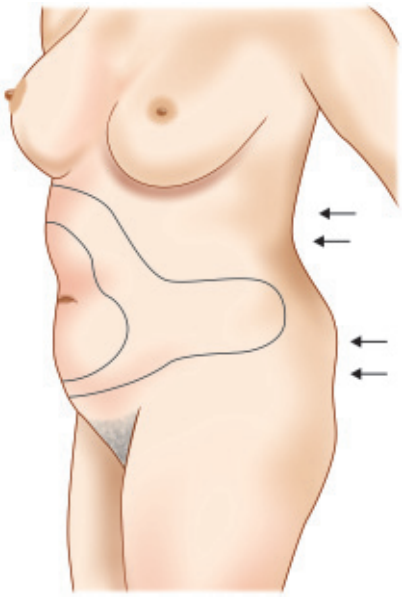


FIGURE 10-24
Although the waist is marked for liposuction, the part above it is left untouched, thus resulting in a straight, shapeless body. Instead, suction should be more extensive

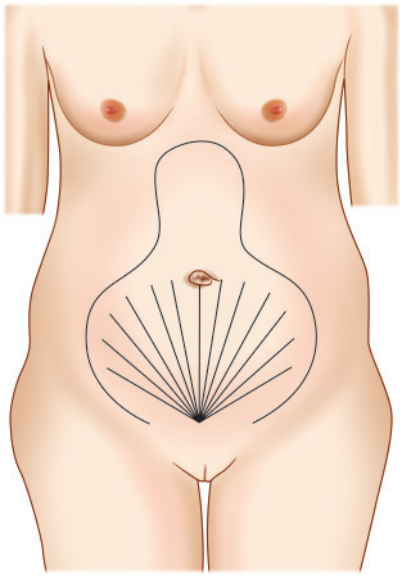


FIGURE 10-25
Wrong design in abdominal liposuction. This design does not takes into consideration the excess of the supracostal area, the waist, or the flanks. This design could actually rarely be applied to an actual patient although it was shown in many previous textbooks

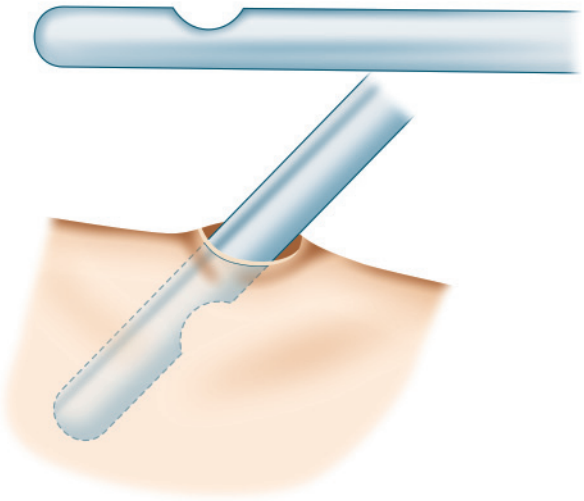


FIGURE 10-26
A cannula with an opening distant from the tip was developed by Illouz in an attempt to allow suction around the umbilicus, an area in which the to-and-through motion is otherwise quite difficult

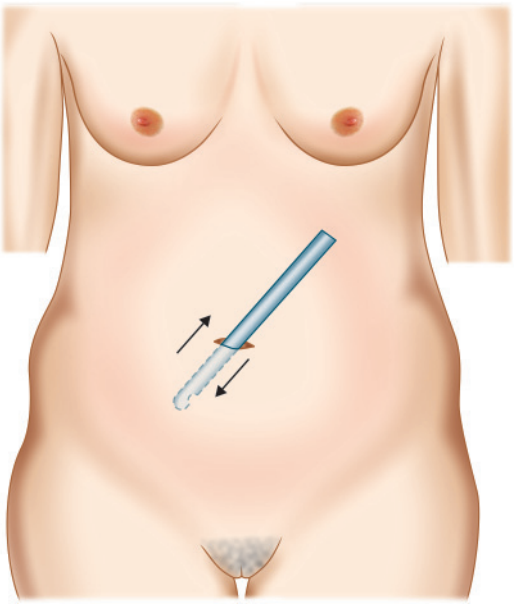


FIGURE 10-27
Unless a careful and thorough suction is performed, the immediate area near the umbilicus will be missed

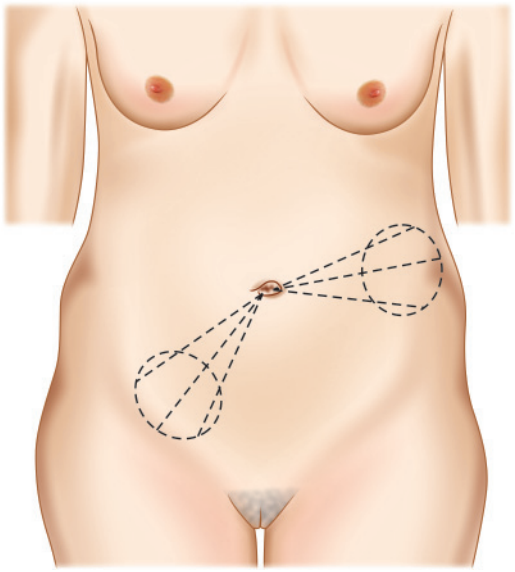


FIGURE 10-28
Localized touch-up areas can be performed under local anesthesia from an umbilical incision using smaller cannulas (size 3)

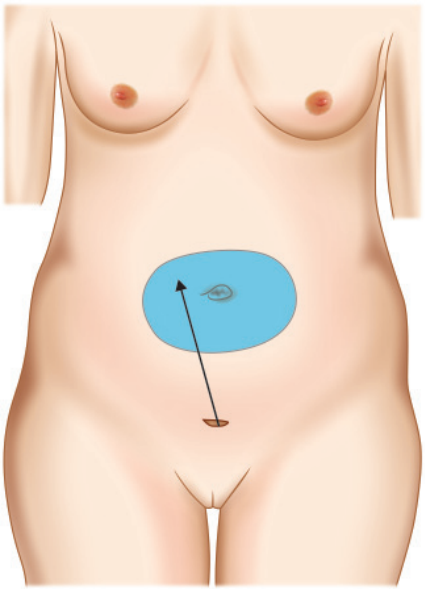
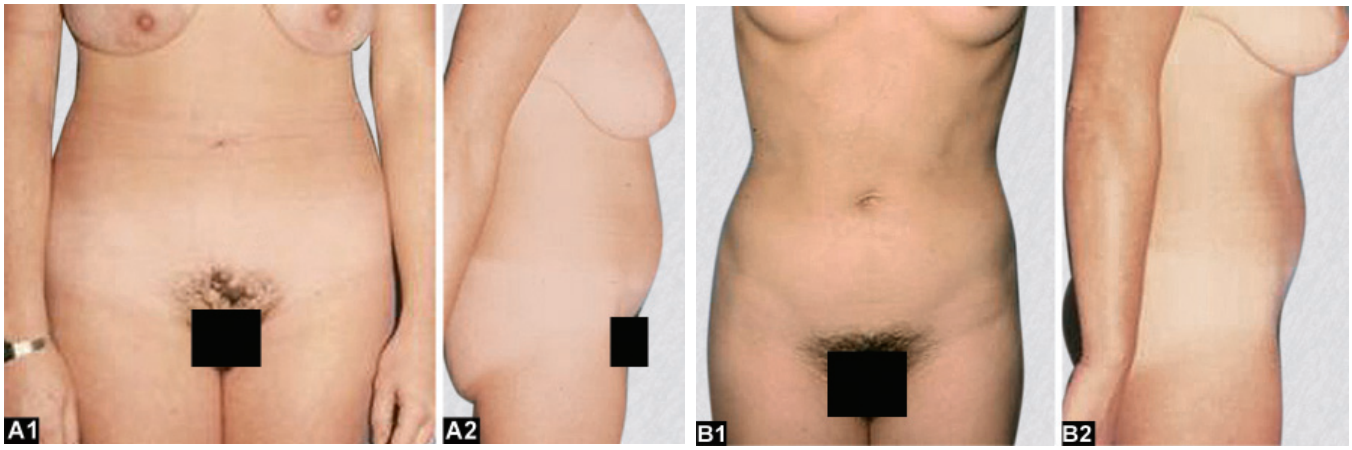


FIGURE 10-29
The inferior pubic incision allows a good defatting around the umbilicus and this approach is excellent for an abdomen with little obesity and touch-up



FIGURES 10-30A AND B

(A) Preoperative; (B) Postoperative

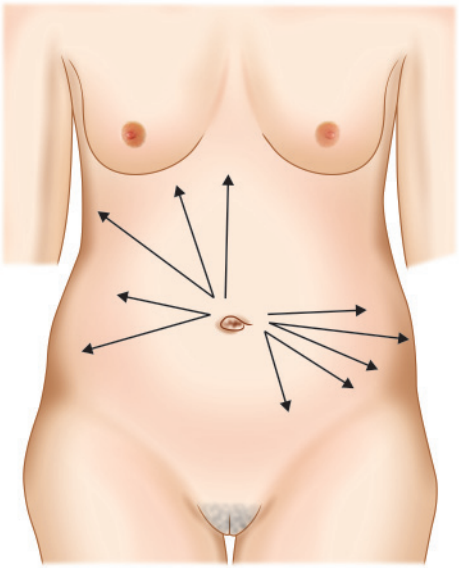


FIGURE 10-31

Obese patients are not easy to sculpture properly. The suction process leaves approximately 2 cm of fat, however, to obtain this level requires an inordinate amount of suctioning. The resulting skin cover will be excessive and will not drape well leaving redundant skin. This phenomenon can be explained by the fact that extreme obesity requires an extreme network of vascular tissue, neural tissue and connective tissue. These tissues are not suctioned, leaving a certain bulk even after a large amount of fat has been suctioned

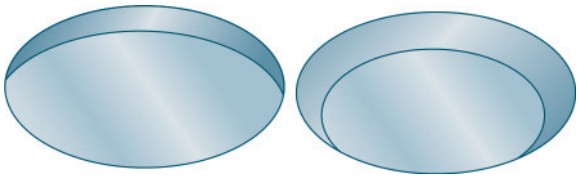
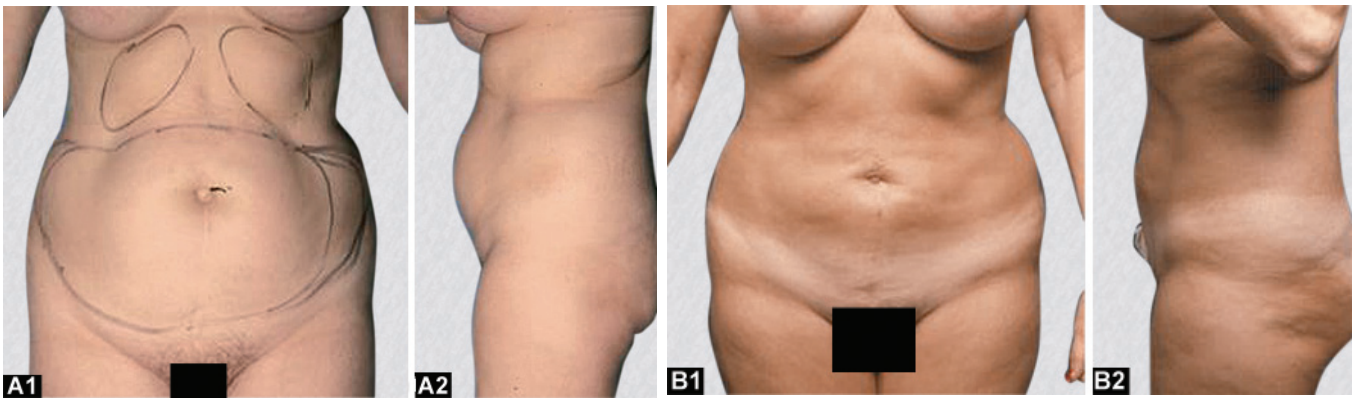


FIGURE 10-32

Due to the body's tubular shape it is often necessary to go further around the waist, thus allowing the flattening effect to show in a contour suction



FIGURES 10-33A AND B
(A) Preoperative; (B) Postoperative

Abdominal Etching

Males are interested in looking more muscular and often are dissatisfied with the appearance of their abdomen since the fatty layer is hiding the muscular look. Attempting to show detailed muscular shapes, a technique abdominal etching has been developed. The technique consists of a combination of superficial and deep liposuction of the abdomen. The deep suction is performed all over the abdominal wall following this step using minimal incision in the umbilicus and the lateral waist area as well as in the pubis, and using 2 or 3 mm cannulas through 2 mm incisions. This technique consists of doing a superficial suction at the level of the muscular insertion of the rectus muscle, ending up in showing bulging areas over the muscular element of the rectus.

The rectus muscle has three main transverse intersections or inscriptions which are varied in their position and length. Often there are three intertendinous insertions at the same level side-to-side or offset at different levels. The transverse intertendinous insertions extend perpendicular to the linea alba. This line can be oblique or could have a stair-shaped configuration and these tendinous insertions are often asymmetric and irregular since their levels are different from side-to-side and can look uneven. The lowest insertion is at the level of the umbilicus with these insertions being narrower than the upper ones. The technique of etching uses a lateral incision as well as a midline and superficial liposuction using fine cannulas or a cellulite dissector type of cannula, removing the fat to the thinnest level possible in order to show the indentation of the intertendinous insertions. This is done after the regular abdominal liposuction has been done and it is a complementing technique depending on the results obtained with the conventional abdominal liposuction. These markings are made in the standing position, carefully indicating the muscular masses.

Abdominal Liposuction Complications

Irregularities, waves, insufficient removal over the pubis, around the umbilicus and the subcostal area and flanks can present postoperative problems. In the presence of a cholecystectomy or appendectomy scar, the suction cannula could inadvertently penetrate the abdominal wall. Bleeding or hematomas are relatively rare. Seromas are more common especially if the cannula cuts a large amount of connective fibers to the abdomen. Other problems consist of an excess abdominal apron in poor indications where the surgery should have been an open lipectomy with suction.

Abdominal liposuction can be an extremely dangerous technique of it is not performed by an operator who is conscientious and consistent in his suction of this area. In particular, one should be careful of possible umbilical hernias that could be perforated with suction. The most common problem is the "washing-board" look secondary to extensive suction and thinning of the skin.

11 Combination of Abdominal Liposuction and Abdominal Lipectomy

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ABSTRACT

The shape of the abdomen and quality of the skin usually varies with ethnic background, number of pregnancies, age, as well as the weight ranges the patient has been through. Often these conditions will result in problems of abdominal redundancy in addition to the fat redundancy, a problem which is not solvable by either liposuction alone or abdominal lipectomy alone. In this chapter, liposuction of the abdomen and abdominal lipectomy alongwith possible complications are discussed.

Introduction

The shape of the abdomen and quality of the skin usually varies with ethnic background, number of pregnancies, age, as well as the weight ranges the patient has been through. Often these conditions will result in problems of abdominal redundancy in addition to the fat redundancy, a problem which is not solvable by either liposuction alone or abdominal lipectomy alone.

Before liposuction, the only treatment available was an abdominal lipectomy that consists of excising the panniculus of skin and fat. This is done with wide undermining of the flaps and advancement of the skin with reimplantation of the umbilicus at a higher level on the skin. Because the scars were often objectionable, liposuction has helped in solving these problems. Other complications that could occur, included skin slough, seromas, and hematomas which are difficult to treat. Often with abdominal lipectomy alone, the patient is left with a large bulge in the epigastric area and two unsightly bulges in the lateral area over the iliac crest. Liposuction, when performed in conjunction with the abdominal lipectomy, is a great improvement **(Figures 11-1 to 11-12)**. Although liposuction alone will improve the protuberant round abdomen, it is limited to cases where the skin is not redundant, presents a good surface and a good turgor.

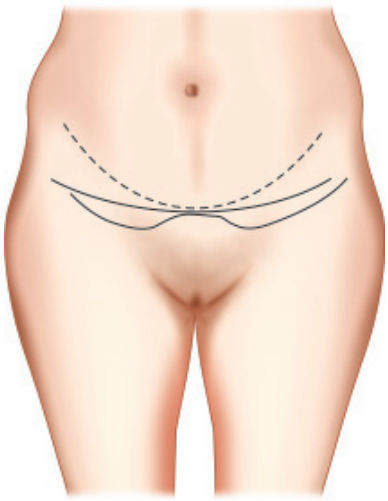
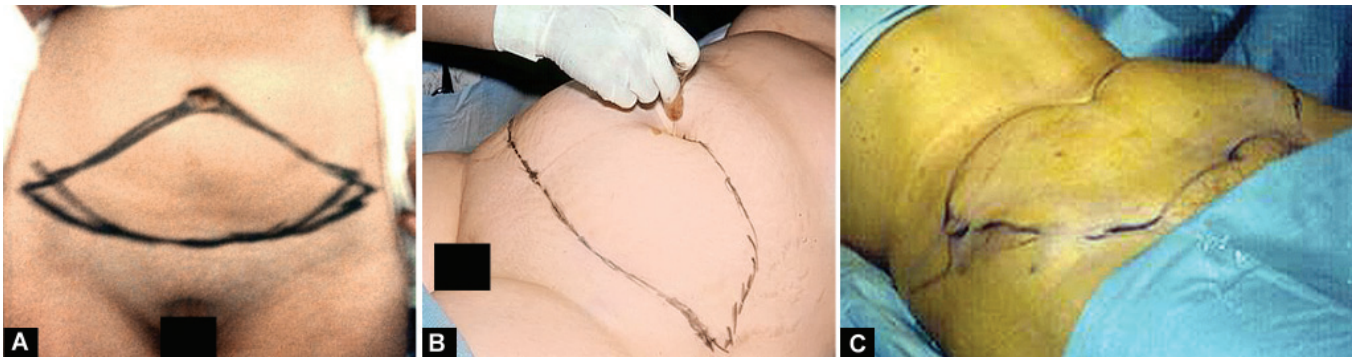


FIGURE 11-1

Multiple shapes of incisions that can be performed in the technique of abdominal lipectomy

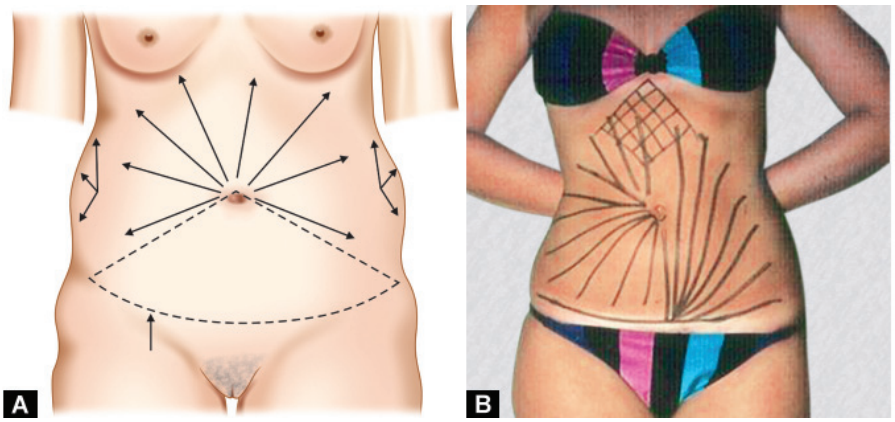


FIGURES 11-2A TO C

Example of the amount of skin that can be and that should be excised for proper healing in an abdominal lipectomy. It encompasses the skin situated between the umbilicus above and the suprapubic area below which can be varied depending on the demands of the case

FIGURE 11-3

Example of scar obtained after abdominal lipectomy when the extent of the space between the pubis and the umbilicus is extensive preventing a lower scar placement due to lack of tissue from the zone above the umbilicus which is irrigated from above



FIGURES 11-4A AND B

(A) Abdominal liposuction is performed from the umbilicus, the suprapubic area and/or lateral inguinal region. The grid area is especially difficult to defatten and should be done with a fine cannula (#3). The lower line shows the incision for lipectomy; (B) Stage 1: After liposuction of the upper flap portion through the umbilicus, an abdominal lipectomy is performed. Before incising the lower flap, liposuction is performed from either of the incisions. A periumbilical and/or a suprapubic incision are useful. It is, however, unnecessary to liposuction the skin flap that is excised during the procedure

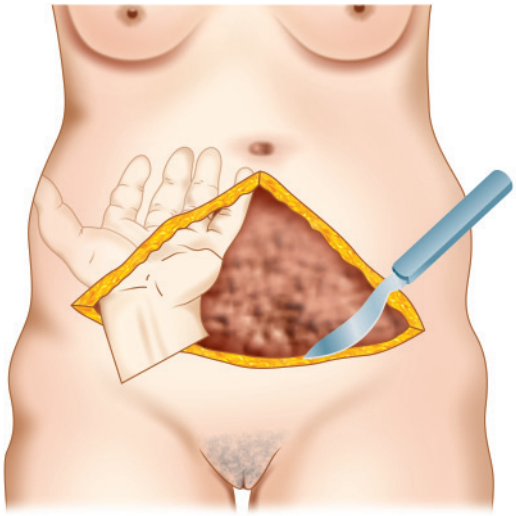
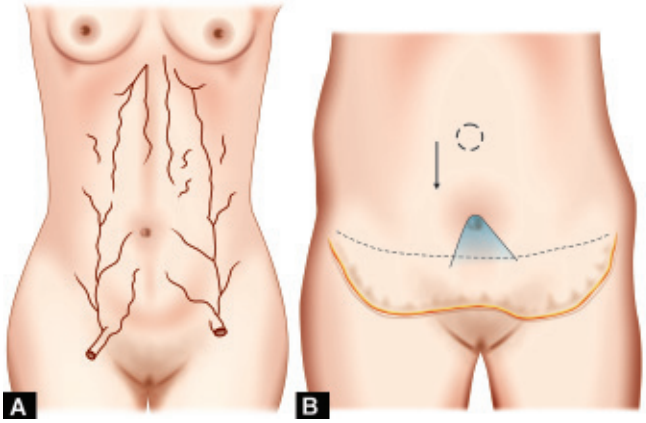


FIGURE 11-5

Stage 2: After liposuction of the lateral abdominal wall, including the flanks, the lower incision is made and the skin flap is raised from the abdominal muscles. The lower abdominal incision is made and the abdominal flap is lifted up to the area of skin excision using sharp and blunt dissection. If the decision for upper skin excision has not been made, surgery starts at the lower edge of the abdominal ellipse. It is often dangerous to make an early commitment for the excision since one could have too short an upper flap



FIGURES 11-7A AND B

(A) Inferior and superior epigastric arteries; (B) The segment of skin supposed to be irrigated by the inferior epigastric artery does not receive blood below the level of the umbilicus, thus the lower part of the flap is jeopardized especially if the lateral undermining of skin has severed the perforators which lie laterally at the level of the rib edge. Any amount of skin flap tension in these cases might end up in necrosis of the central lower portion of the flap marked in gray

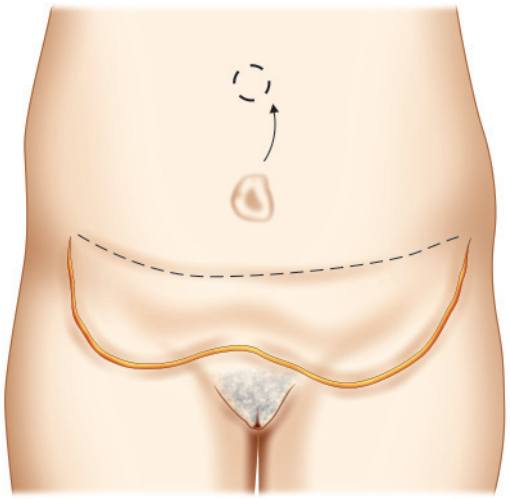


FIGURE 11-6

Stage 3: An estimate of the skin excess is made by bringing the flap down. The stippled area shows the excision to be performed and this is done in one or two segments to make it easier for excision. Note the need to reposition the umbilical stalk to create a neoumbilicus if the original one is excised

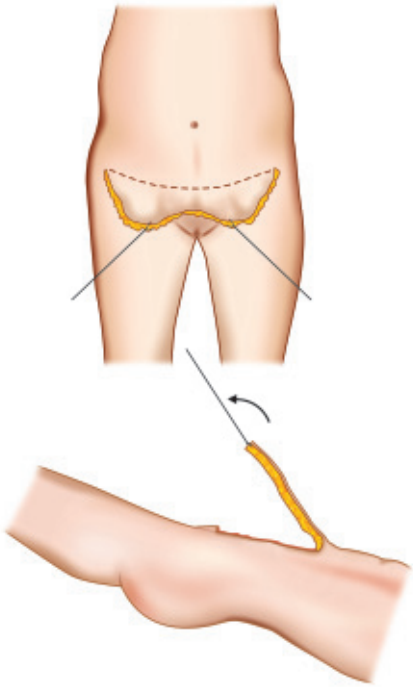


FIGURE 11-8

After abdominal liposuction, opening the abdominal wall and elevating it shows the vascular and nervous strands left intact attaching the skin to the muscle below. This view negates the "tunnel" concepts

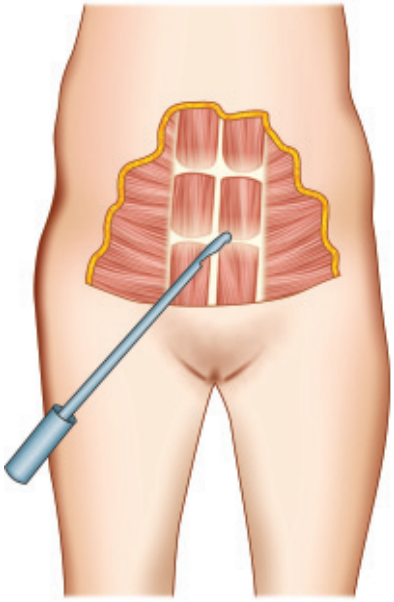


FIGURE 11-9
Stage 4: Open sky liposuctioning of the flap and umbilicus reimplantation. After the excess skin has been excised suction of the upper flap is again performed. Undermining of the upper flap is done up to the xyphoid and the ribs. At this stage the muscle repair is performed imbricating the rectus muscle fascia with either absorbable or nonabsorbable large sutures

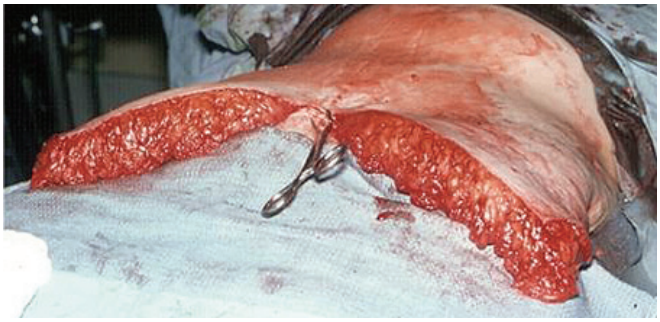


FIGURE 11-10
Floating umbilicus is transplanted at a lower level of the abdominal wall

FIGURE 11-11
Liposuctioning of the flanks, pubis, and iliac crest is best done at this stage. One should again avoid the perforators

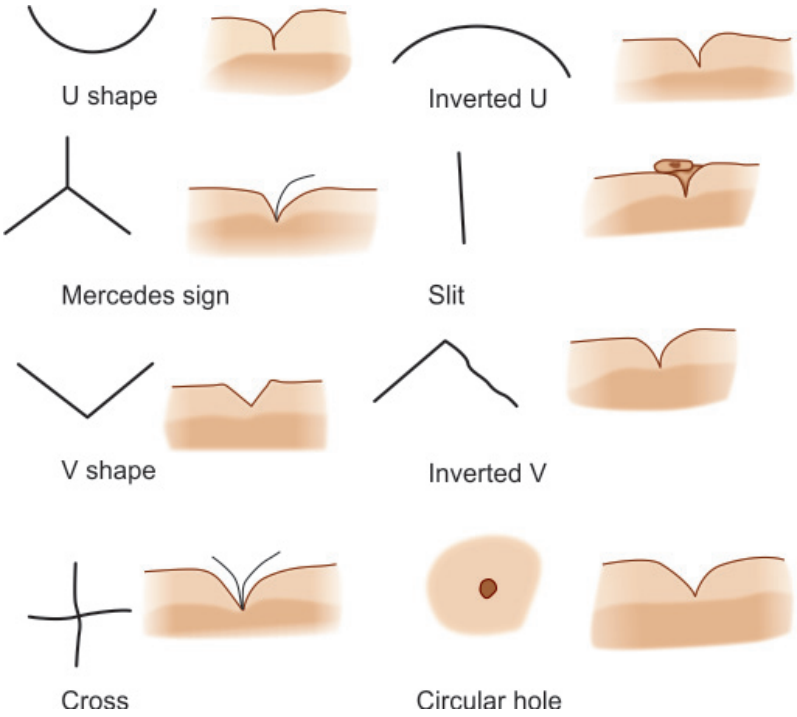


FIGURE 11-12
Stage 5: Neoumbilicus formation. Reimplantation of the umbilicus is done and the skin flap is sutured in position. The umbilicus can be shaped in many different shapes depending on the incision performed, such as a U-shape, Mercedes sign-shape, V-shape, or even a cross shape or circulation hole with defatting of the fatty layers around the puncture hole

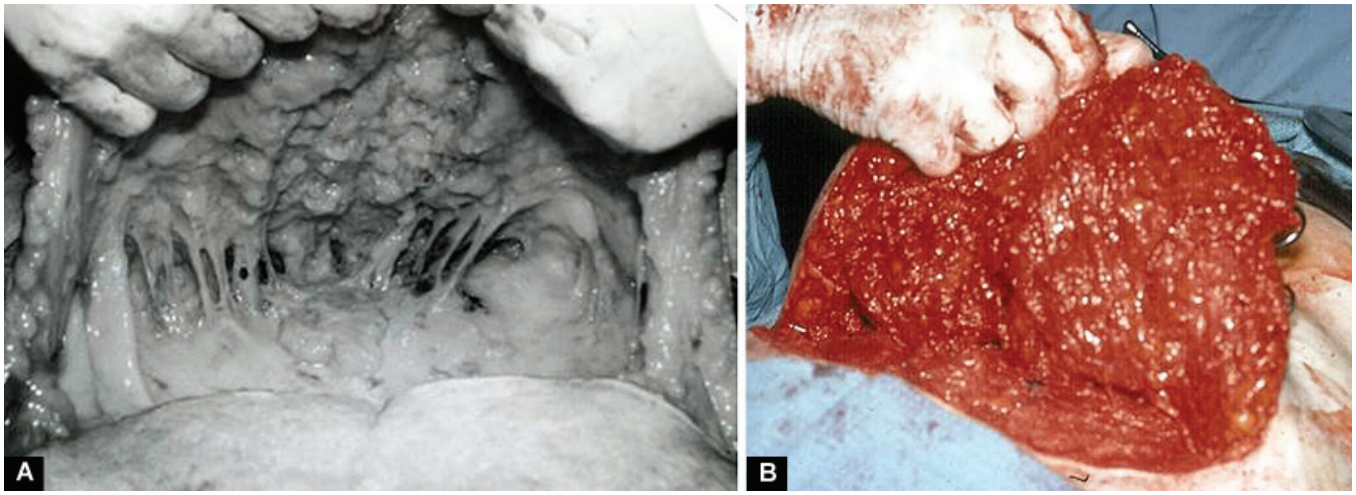
The quality of skin is the most important factor especially after pregnancies as after 40 years of age the skin will not contract properly. Another problem consists of the discrepancy in the thickness of the abdominal skin above the scar and the inguinal skin below. A pure abdominal lipectomy ends up in a shapeless abdomen with a round protuberance with no specific indentation and no bulges in the area of the rectus muscle. Thus, liposuction will enhance the results of lipectomy and the opposite can be helped as well. Another advantage is the usefulness of the liposuction in reducing unsightly bulges that cannot be removed by lipectomy alone.

Indications

- Patients who have a slight amount of obesity localized around the umbilicus and epigastrium and who have good skin tone with no excess are candidates for liposuction alone.
- Patients who have some excess of abdominal fat and previous vertical or horizontal scars lend themselves to an abdominal lipectomy in combination with liposuction and scar revision with some type of skin excision.
- Patients who have very little fat excess and a much wrinkled abdomen or stretch marks are mainly candidates for lipectomy bearing in mind that the suction will only improve some of the contour without removing the scaring of the stretch marks.
- If the patient still has, in these cases, a little too much skin redundancy, then a limited lipectomy will be more useful in addition to liposuction. The limited lipectomy consists of an inferior pubic scar very acceptable to patients.
- Patients who have a very large amount of fat and only a certain degree of skin redundancy may benefit from suction alone followed only secondarily if necessary by an abdominal lipectomy if the skin has not retracted well enough.
- Patients who have excess skin and fat in the abdomen with abdominal aprons are good candidates for a combination of the suction and abdominal lipectomy. These scars will often be shorter than those with lipectomy alone. The skin excess dictates the proper excision for closure without dog-ears.

Caveats

Patients should be warned of the problems mentioned such as skin slough, irregularities, waving and scar hypertrophy, and they should be told that a large scar will result from the lipectomy even if it is performed in conjunction with liposuction. It is incumbent upon the surgeon to explain fully to the patient the advantages of suction especially in the avoidance of scarring. The surgeon on his part should look for possible umbilical hernia, diastasis recti, and incisional hernias to avoid complications.



FIGURES 11-13A AND B

After abdominal liposuction lifting the abdominal wall and elevating it will show the vascular and nervous trend left intact, attaching the skin to the muscle below. This negates the notion of tunneling which amounts to visual concept which is not the right concept when one sees that type of tissue left after liposuction. The lateral border contains the perforators that should be saved

Markings and Preoperative Preparation

Markings are made on the erect patient **(Figures 11-13A and B)**. Using inspection, palpation, and pinch test, the fat excess is determined in the epigastrium, the midabdominal area, the flank, the lower abdominal area, the suprapubic area, and the thinner zone above the iliac ridges. Markings are made accordingly. These areas will include the epigastrium and the flank as well as the periumbilical area. Although there is some excess fat in the lower abdomen, one should be careful and often one will have to defat the suprapubic zone including the mons pubis in order to prevent a sudden drop at the junction with the pubis **(Figures 11-14 and 11-15)**.

A circumferential area to be liposuctioned out is marked and the fatter zones are marked with crosses. The waist is marked and it is shown in its proper location. The epigastrium also is marked with crisscrosses. Strenuous crisscrossing of the epigastrium will be necessary for good defatting since that zone is densely occupied by septa and is tougher for liposuction.

Incisions

- An incision is made in the infraumbilical area or in the supraumbilical area. This will allow the suction to be performed either all around the abdomen or only in the upper abdomen when a combination of procedures is used. This makes it generally easier to perform the liposuction without missing any zones especially the whole epigastric area which is then becoming the hypogastric zone after its transportation advancement below **(Figures 11-1 to 11-3)**.
- A suprapubic incision will allow for straight suction of the whole abdominal wall. One will have to concentrate especially on the upper abdominal portions before the lipectomy itself. This incision is useful when one wants to defat the entire periumbilical area.
- Any scar can be used for liposuction if scars are present and either the scar will be completely revised or it could remain untouched. Only a small portion of the scar will then be utilized for the introduction of the cannula. If the scar happens to be vertical, the suction lipectomy is performed from one of these areas which is then excised with an ellipse around it. If the scar is eccentric, such as a cholecystectomy or appendectomy scar, it might be difficult to use it for lipectomy; however, it can be used for liposuction before completion of the lipectomy.

Anesthesia

In view of the extent of surgery, general anesthesia is preferable. The usual xylocaine with epinephrine solution is infiltrated in a tumescent fashion.

Prepping, Draping and Surgical Technique

The patient is prepped and draped in the routine manner. The first step of the technique consists of liposuction. It is performed from the elected incision using a 4 mm

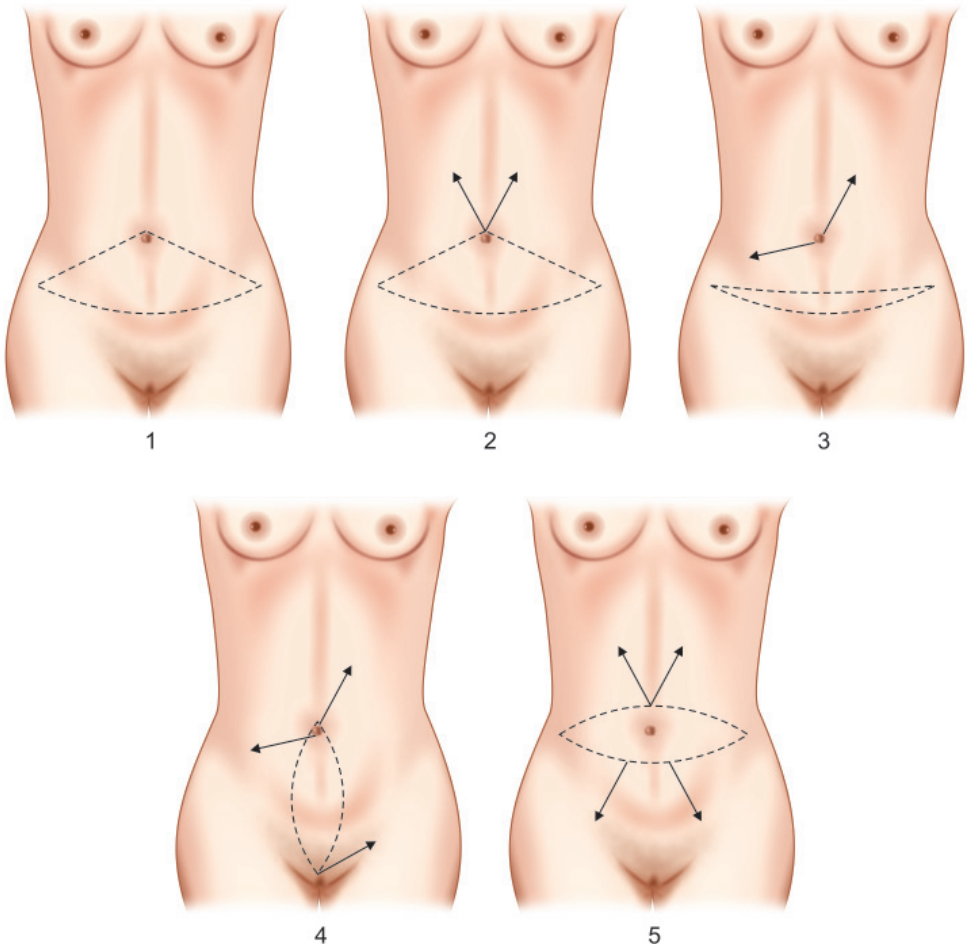


FIGURE 11-14
Abdominal suction lipectomy through the umbilicus and the area of a previous scar, can involve scar revision with a conservative scar excision and repair, in a so-called miniabdominoplasty technique

FIGURE 11-15
Different incisions can be made for the combination of abdominoplasty with liposuction depending on the actual defect of the patient and the actual scars

and 3 mm cannula. If there is scarring, a 3 mm cannula may be more useful. In cases where the operator knows the lower segment of the abdominal wall will be excised for abdominal lipectomy, there is no need to suction that zone. Depending on the possibility of advancement of the upper skin flap, the lower incision might be raised especially in the pubic area in order to perform the closure without excessive tension.

Extent of the Liposuction

It is performed in the whole upper abdominal area extending approximately 2 inches beyond the area marked for undermining and for closure of the lipectomy. This will help in draping the skin without tension. In addition, the feathering of the suctioned areas allows a good transition with the unoperated zone **(Figures 11-4 to 11-12).**

Refinement

Refinement consists of feathering and fine cannulas are used to improve some of the recalcitrant areas after lipectomy is performed. Important areas to feather are the zone over the ribs, the waist and the mons pubis. If the mons pubis is fat, it should be suctioned leading to a more esthetically acceptable appearance with a good transition to the thickness of the skin flap. The lipectomy is done in a routine manner excising the ellipse of skin and suture ligating the vessels encountered in the excision. The upper flap is then completely undermined up to the rib cage and the xyphoid and advanced into position. An attempt should be made to drape the skin properly to avoid plication laterally. The umbilicus location is determined under the skin and a new opening is made on the elected site. The zone around the new opening is defatted by sharp dissection to allow a deep umbilicus. Repair of the rectus is performed before this stage.

Closure

Once the zone is reapproximated the closing is performed in layers for the lower abdominal scar using either chromic or vicryl sutures in the deep layers and subcuticular suture for the skin.

Postoperative Care

The surgery being more extensive and more painful than liposuction alone, there are more complications as well as postoperative rehabilitation. Patients are allowed to extend their trunk gradually since they are asked to flex the trunk over the thighs for approximately 30 degrees for a period of 10 days. This facilitates viability of the flap free of excess tension. Drains are removed according to the amount of drainage. If a large drainage is found, the drains are left approximately 4–7 days, however, if it seems relatively dry, they are removed the second postoperative day.

Abdominal Esthetic Surgery

Planning the Operation

The appearance of the abdominal wall presents many variations which depend on the degree of obesity, skin laxity, and the status of the abdominal muscles. In order to obtain and appealing abdomen, it is important to bring some variations in the surgical repair. The liposuction has allowed many variations and has allowed to sculpt the abdomen properly.

Examination

Examination estimate of removal and technique are performed while the patient is standing and sitting. This allows the judgment of the excess of skin either at the epigastrium or above the pubis. Palpation gives an exact idea of the fat deposit and the necessity of the suction as well as the state of the rectus abdominis muscle, the degree of diastasis and possible umbilical hernias or Spiegelian hernias.

Classification of the Types of Abdomen

Many classifications have been presented (de Souza Pinto et al,[1] Wilkinson,[2] Greminger,[3] and Matarasso[4]). However, it is difficult to classify and assign numbers to the many varied states of the abdominal wall. It is only by judging the elements present and the variations present that the surgeon will decide the treatment to be used.

The consensus of opinion is that there is more than one useful technique available for so many different problems in the abdominal wall structure. The treatment will be the following:

- Liposuction only
- Rectus muscle plication either through an inferior flap incision or through an umbilical incision (Souza Pinto[1] or Faria-Correa[5])
- Lower skin excision with any extent of skin undermining
- Skin excision with undermining up to the umbilicus and the xyphoid and ribs

- Mini-abdominoplasty: Partial undermining up to the umbilicus and lower excision **(Figures 11-10 to 11-15)**.
  - Recreation of a new umbilicus
  - Excision and re-implantation of the umbilicus.
  - Floating of the umbilicus.

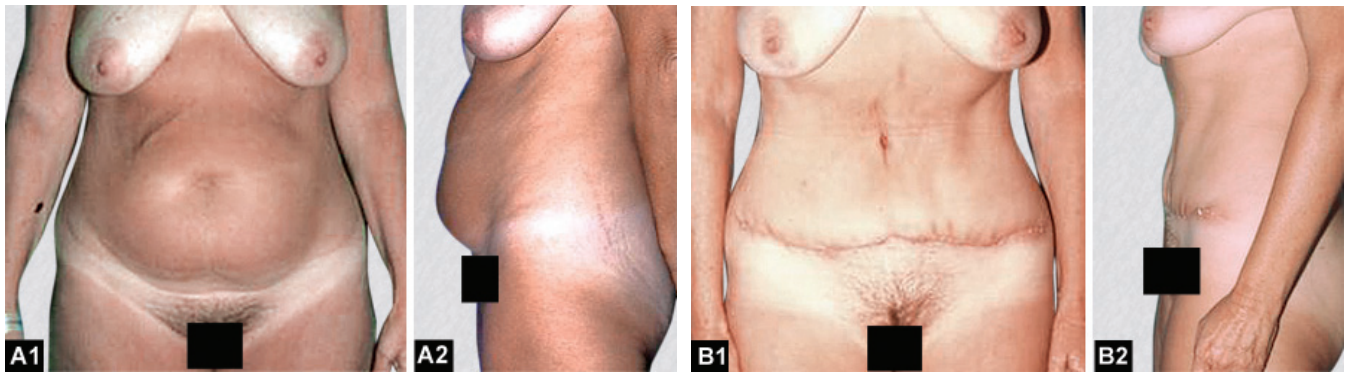
The Umbilicus

The umbilicus is left untouched in cases of lower abdominoplasty or mini-abdominoplasty. In some cases it is possible to detach it from its deeper attachments through the rectus fascia and to float it down with the surrounding skin at a lower level (providing that it remains esthetically within normal range).

In some cases, where a large amount of skin is excised, a new umbilicus can be created by excising the skin at the new umbilical region, defatting it and attaching it to the fascia where the previous umbilicus was present. This technique of making a completely new umbilicus out of skin flap is often more satisfactory than keeping the umbilicus itself since this one can result in a circumscribed, contracted, less natural-looking scar **(Figures 11-11 to 11-13)**.

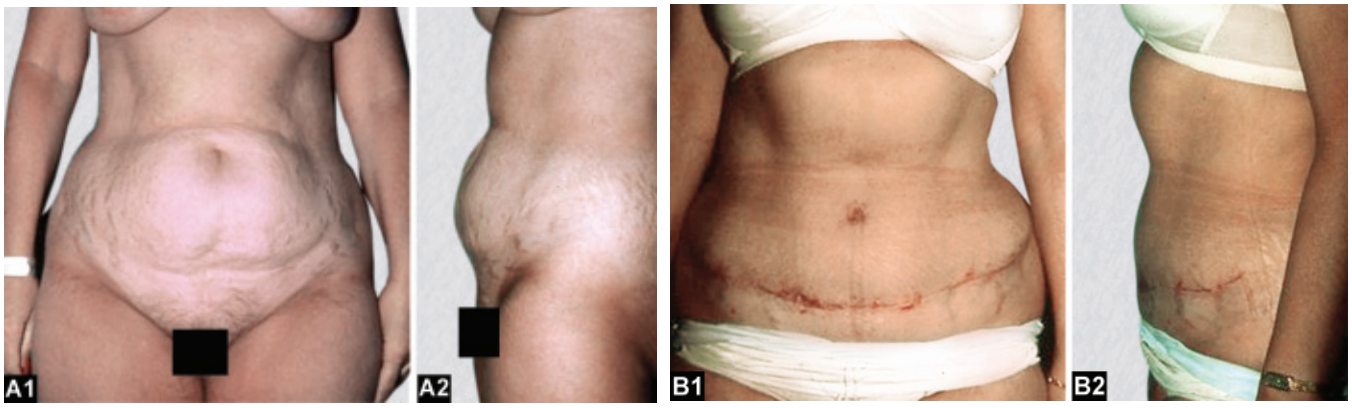
Complications

The rare complications seen in liposuction of the abdomen have not been reduplicated in the cases of combinations of suction with lipectomy. The risks are now more real and are similar to the risks and complications secondary to abdominal lipectomy such as wound dehiscence, skin slough, deep vein thrombophlebitis, pulmonary embolus and so on. The actual concept is to stage in two procedures. It is felt that liposuction combined with abdominal lipectomy has relatively high percentage of complications as compared to liposuction alone **(Figures 11-16 to 11-24)**.



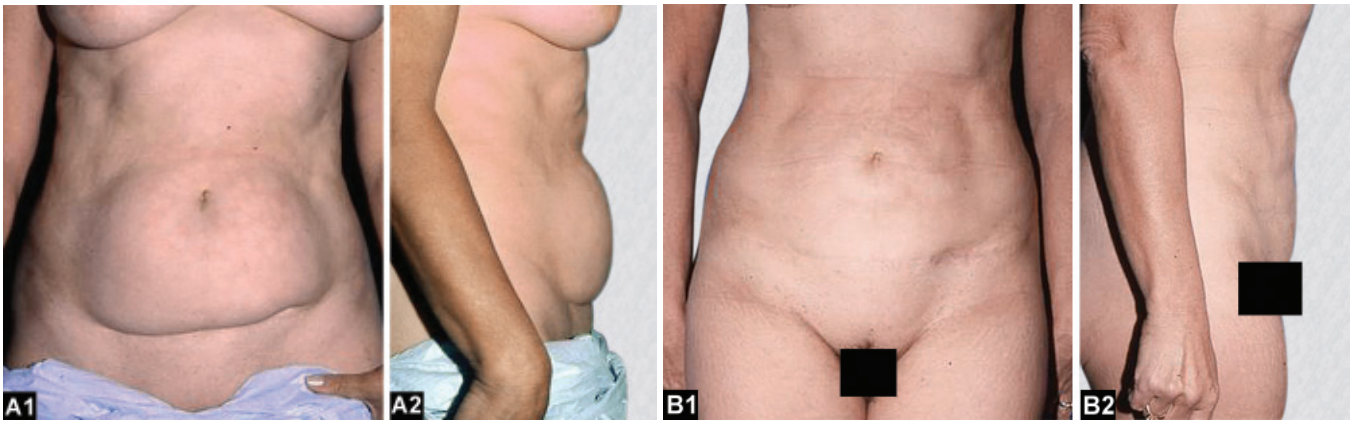
FIGURES 11-16A AND B

(A) Preoperative 59-year-old woman with abdominal lipodystrophy and cholecystectomy scar; (B) Six months postoperative liposuction and abdominoplasty; notice that the cholecystectomy scar was completely excised



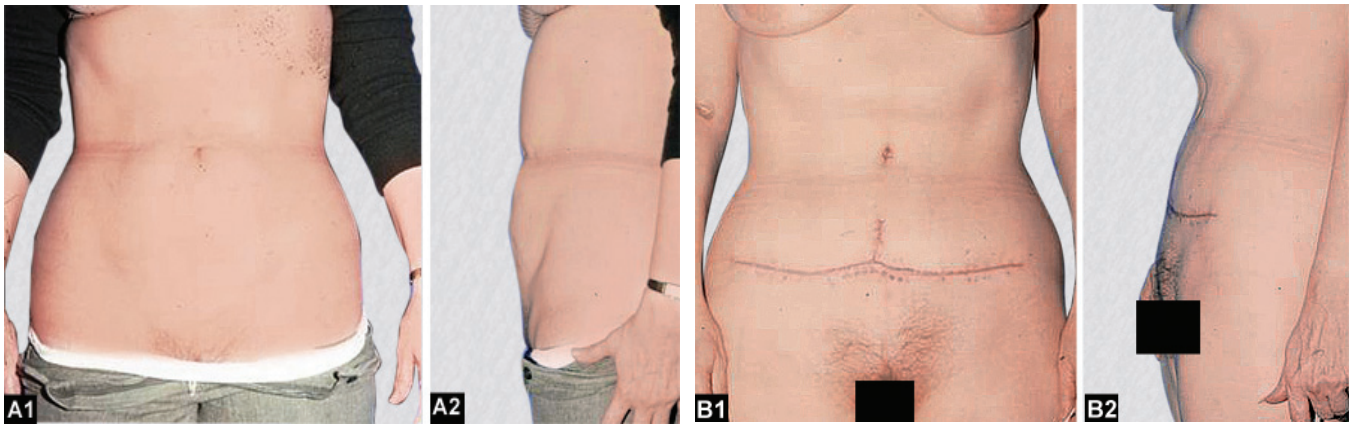
FIGURES 11-17A AND B

(A) Preoperative 58-year-old woman with abdominal lipodystrophy and loose abdominal skin. Liposuction-alone will not suffice. The result can be disappointing—excess skin, sagginess, irregular areas and deep infolding of the previously visible fold; (B) Two months postoperative after combination of liposuction and lipectomy. The scar ends up high in cases where the umbilicus is distant from the pubis. This excessive distance will be difficult to gap with the remaining abdominal flap which should come up to the zone of junction between the upper epigastric artery and the lower epigastric artery



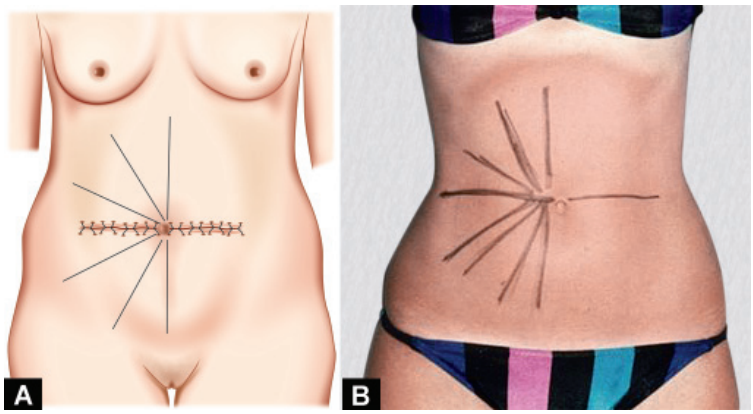
FIGURES 11-18A AND B

Patients with good skin tone and moderate skin flabbiness can have satisfactory results in spite of older age. However, for patients with excess obesity and skin flabbiness and excess, the results of isolated suction lipectomy will be poor cosmetically although somewhat improved in reducing the size of the abdomen. In some cases, the treatment of skin excess should be more radical; otherwise defects will appear. The area undermine hardens and is thick and rigid. Thus, if only part of the abdomen is undermined, the lower portion will appear swollen, rigid, and excessive for quite some time. It appears better to undermine the whole lower abdomen instead of only a portion. (A) Preoperative; (B) Three months postoperative with some irregularities and bumps



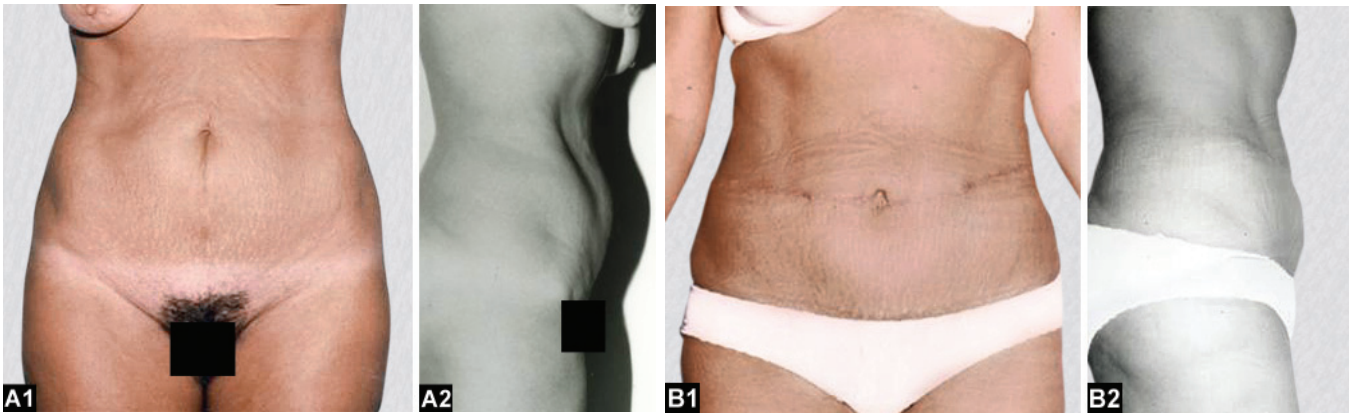
FIGURES 11-19A AND B

(A) Preoperative 45-year-old woman with mild abdominal lipodystrophy and moderate skin excess, epigastric bulging, and flaccidity; (B) Six months postoperative following combination liposuction and lipectomy. A long distance between the umbilicus prevents a low abdominal scar. Although the scar remains high in these cases, the shape of the abdominal wall is well-preserved as opposed to cases of low incisions. A profile showing the epigastric bulge postoperatively. Due to the dense fibrous tissue present in this area, this bulge is sometimes difficult to improve. In cases of expressionless abdomen, liposuction of the lateral part of the flap is indicated



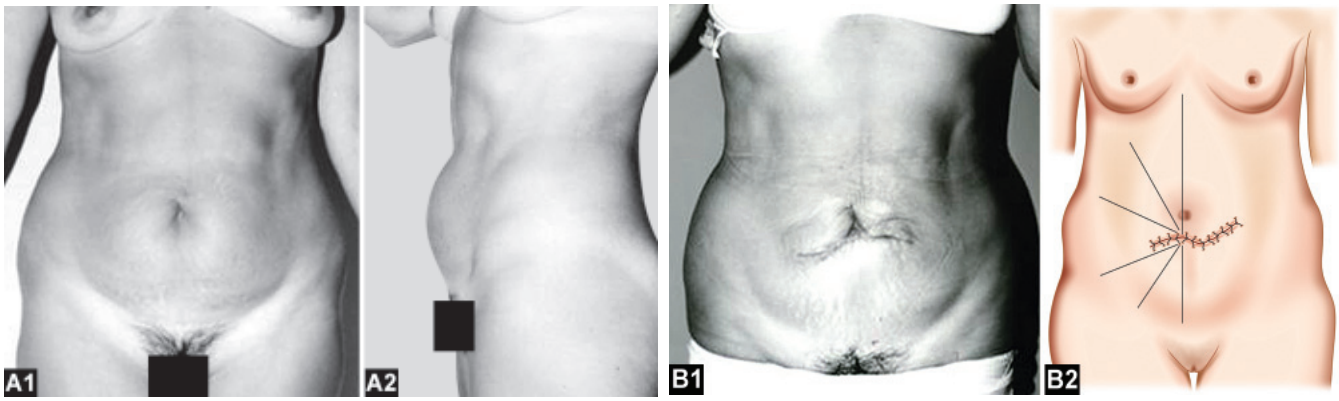
FIGURES 11-20A AND B

Suction lipectomy of the abdomen precedes the waist skin excision, depending on the existing scar or the extent of the skin excess. The extent of the waist scar will differ



FIGURES 11-21A AND B

(A) Preoperative 52-year-old female with abdominal lipodystrophy and well-healed, bilateral sympathectomy scars; (B) Postoperative following excision of the sympathectomy scars and liposuction of the abdomen and saddlebags



FIGURES 11-22A AND B

(A) Preoperative 56-year-old female with abdominal lipodystrophy and moderate loose skin below the umbilicus; (B) Postoperative after suction lipectomy and minimal skin excision at the excess skin area. No planning of this scar was made. It is only the result of excess skin excision

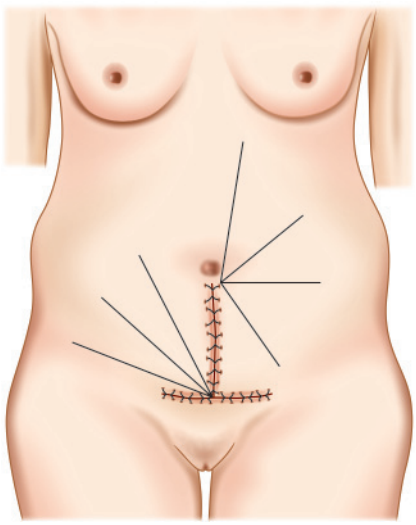
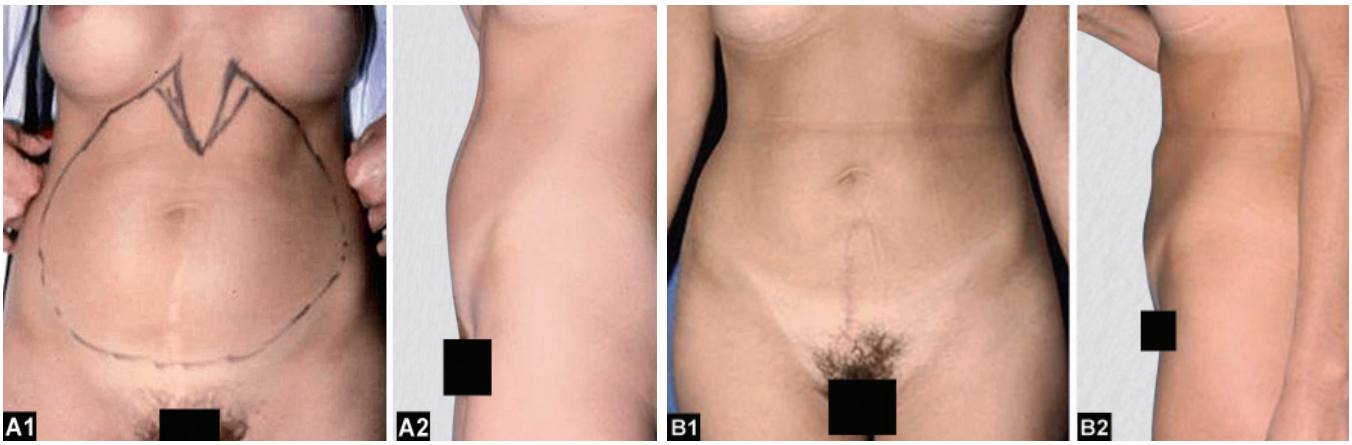


FIGURE 11-23

Treatment of abdominal lipodystrophy with vertical scar: Liposuction is performed first from the upper and lower parts of the scar. Then a scar revision is made down the length of the scar. It is important not to defat the edges of the scar for 1–2 inches in order to prevent depression of the scar



FIGURES 11-24A AND B

(A) Preoperative 40-year-old female with moderate lipodystrophy and a straight midline scar; (B) One year postoperative after excision of scar and liposuction

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12 Liposuction of the "Love Handles"

Adrien E Aiache

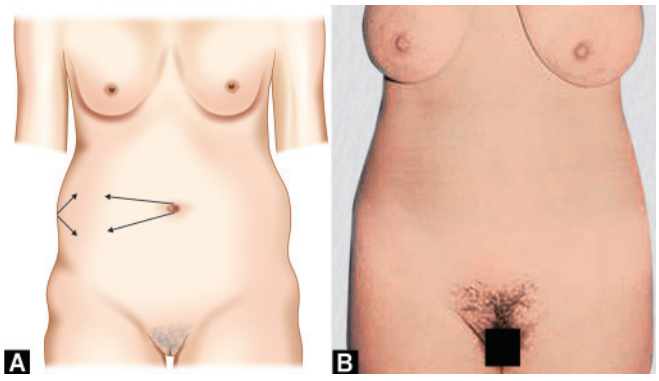
ABSTRACT

Love handles are a common problem in older patients, especially middle-aged adults, who have put on some weight. Males may have fat deposits over the lateral waist although the remaining part of their body is relatively fit. These males have excess fat deposits in the flanks but otherwise a normal body habitus. This condition is also found in females in association with other fat deposits. The habitus in the female consists of a large torso on a thin, narrow pelvis and straight leg which becomes a problem when these women get fatter and older, and the fat layers will essentially occupy this area in a uniform fashion giving the same type of deformity as the so-called love handles, seen in men. Liposuction of the "love handles" is discussed in this chapter.

General Principles

Indications

Patients with love handles are divided into two types: (1) Males who have fat deposits over the lateral waist although the remaining part of their body is relatively fit. These males have excess fat deposits in the flanks but otherwise a normal body habitus. Although often seen in men, this condition is also found in females in association with other fat deposits. (2) The habitus in the female consists of a large torso on a thin, narrow pelvis and straight leg which becomes a problem when these women get fatter and older. These women look lovely when young. If their thin elongated narrow bodies then put some fat on in middle age, the fat layers will essentially occupy this area in a uniform fashion giving the same type of deformity as the so-called love handles as seen in men **(Figures 12-1 to 12-3)**.



FIGURES 12-1A AND B

Incisions for love handles and for waist on a Nordic-type body with long thorax, narrow hips and straight legs. The absence of a waist depression can be corrected with liposuction through the abdominal liposuction umbilical incision and direct approach through the flank

FIGURE 12-2

A 52-year-old woman with narrow pelvis and an absent waist who has previously undergone abdominal liposuction

FIGURE 12-3

The absence of a waist on a patient with a narrow pelvis and a broad chest. A typical problem presented in this case is such a poorly defined waist in the female

Age

Love handles are a common problem in older patients, especially middle-aged adults who have put on some weight. This problem is associated with shortening of the spinal column secondary to flattening of the intervertebral disks and collapsing of the spine with aging ending up in telescoping of the skin giving the excess on the sides and anteriorly.

The problem is essentially the same in males and females and the correction of the deformity consists of an abdominal and waist liposuction **(Figures 12-4 to 12-9)**.

FIGURE 12-4

In the creation of a waist, the liposuction process starts from the umbilical incision and progresses further towards the waist

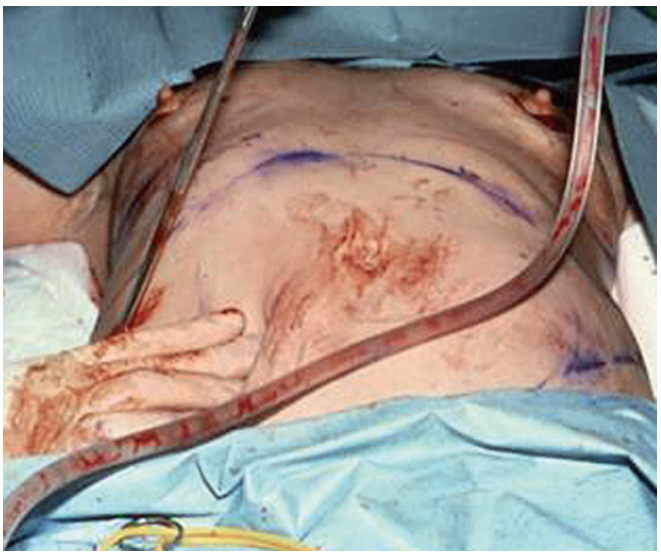


FIGURE 12-5

A direct approach in creating a waist is through the lateral incision

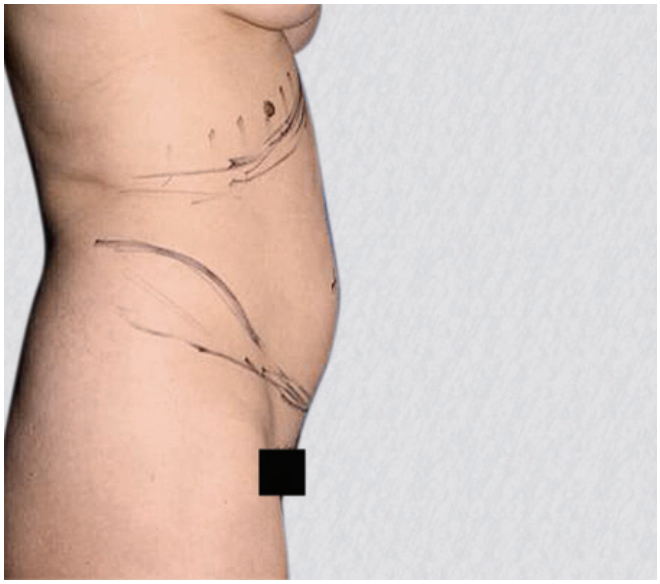


FIGURE 12-6
A waist can be created by the abdominal liposuction. Markings are made in the standing position and often are useful in the sitting position which gives an accentuation of the deformity

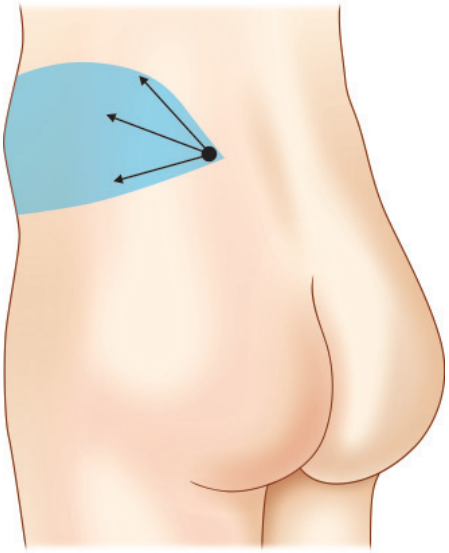


FIGURE 12-8
The posterior approach for love handles suction on the paraspinal area that is as useful

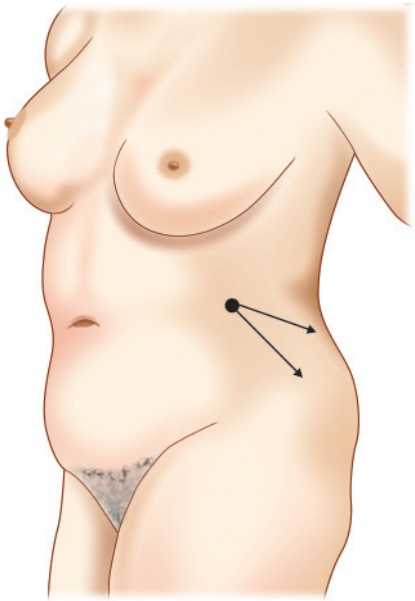


FIGURE 12-7
Anterior approach to love handles suction using a superior crease of a stretch mark for the incision

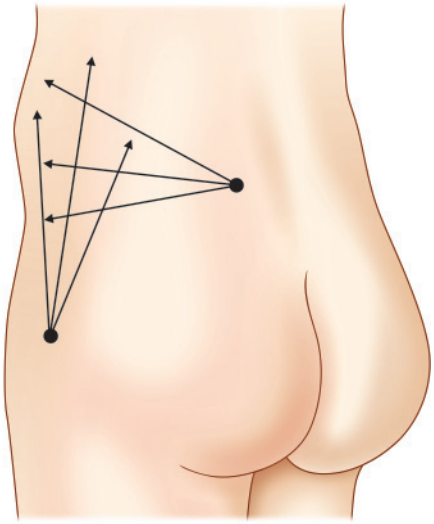


FIGURE 12-9
Crisscrossing from a hip and sacral incision

Caveats

Patients should be warned about the possibility of irregularities, dents and the fact that the skin might not drape properly especially in the anterior abdominal portion although the love handles themselves usually drape well. In addition, the patient should be warned about the possibilities of irregular correction, especially in the waist, which is very difficult to suction evenly due to the special texture of the fat in that area. In cases where there is an excess of skin it will then be necessary to use a combination of techniques with liposuction and skin excision such as the flank plasty or the hip lift as advocated by Lockwood.[1]

Preoperative Preparation

Patients selected for liposuction of the flanks and abdomen should have only a moderate deformity. This technique is not satisfactory in the correction of obesity and will only exhibit the poor results of a difficult extensive surgery. The preparation is the usual for liposuction.

Anesthesia

Anesthesia is most often general. Only in a very limited number of cases local anesthesia can be performed in that area which is very tender.

Local anesthesia can be used in cases of very minimal deformity, or if the patient wants only the creation of a new waistline. This request is common in women who want to have an improvement in their silhouette.

Markings

Markings are made with the patient in the upright position. They may be isolated to the area of hypertrophy. They depend on the appearance of the deformity in the tangential position showing the protuberance in straight anteroposterior position or in an oblique view. The pinch test is also usually useful. Two parallel lines are made reaching posteriorly and anteriorly ending up at the lateral limits of the rectus muscle or if it is done in conjunction with abdominal liposuction, it is included in the drawing **(Figures 12-7 to 12-9)**.

Prepping and Draping

The patient is usually placed in the supine position for prepping and draping. The prepping is the usual and draping is from the nipple down to the pubis.

Incisions

Two types of incisions are made, either from the abdominal liposuction the incision is infra- or supraumbilical, or a pubic incision. A second incision will be necessary especially to obtain a good waist line and the incision will be lateral to the rectus muscle belly at the level of the umbilicus. If the flank is to be completed in the supine position, the incision will be in the parasacral area.

Instruments

4 and 3 mm cannulas are useful. The completion of the procedure is usually done with a Robles cannula which helps in finessing the zone and defatting the tissue to its maximum.

Technique

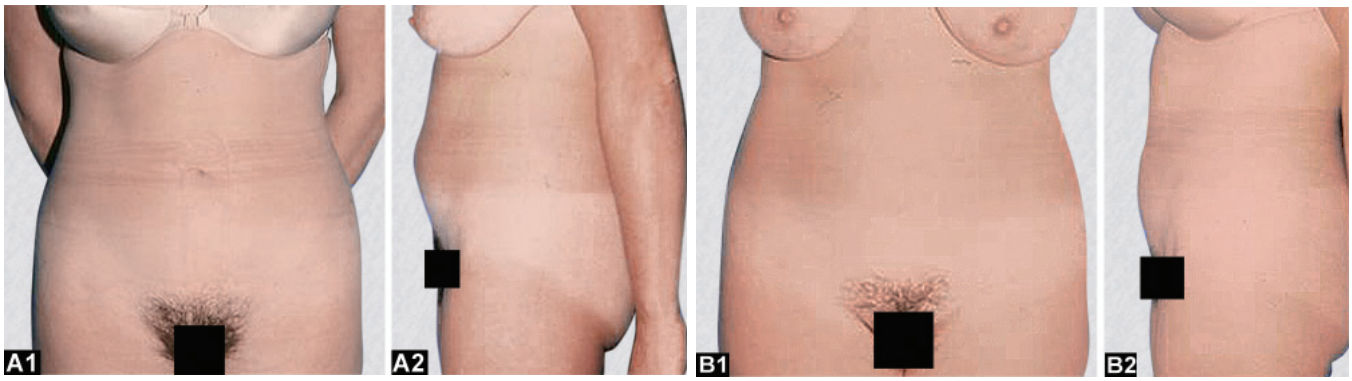
The sawing motion of the cannula is used starting in the upper part of the bulge and ending gradually lower near the iliac crest. The motion should be continued until an appreciable difference is found in the waist by examination and the pinch test. It is very important in women who need it the most. In cases associated with abdominal liposuction, a complementary liposuction of the anterior part of the flank is done after abdominal suction using the 4 mm cannula introduced through the umbilical scar. This allows crisscrossing in the anterior aspect of the deformity and at this point the patient can be placed in prone position where completion of the waist is done from the parasacral incisions. Depending on the extent of the liposuction, the patient is either sent home or to a nursing home or to the hospital **(Figures 12-10A and B)**.

Refinements

Refinements consist of the feathering technique performed above the markings over the areas of the ribs and inferior in the zone of the iliac crest laterally and medially as well as possible to obtain a harmonious waist. Not only should one be careful in removing enough of the fatty deposits in that area, but the mesh undermining is useful in obtaining a better cosmetic result.

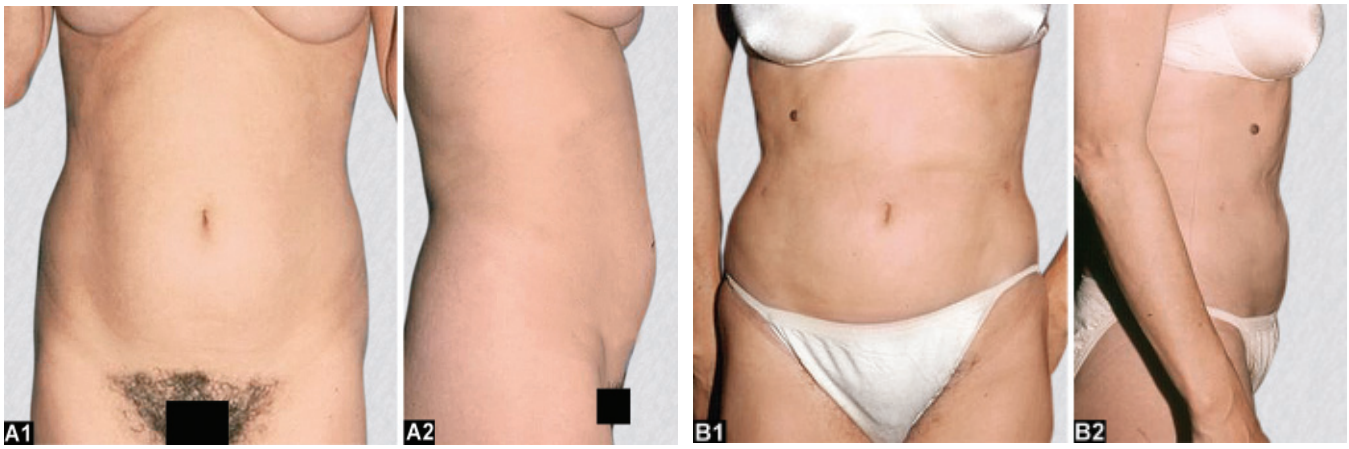
Complications

The usual complications of lumps and depressions are seen, as well as irregularities and sometimes hematomas. The most common complication is of a cosmetic nature showing an uneven result and lack of symmetry.



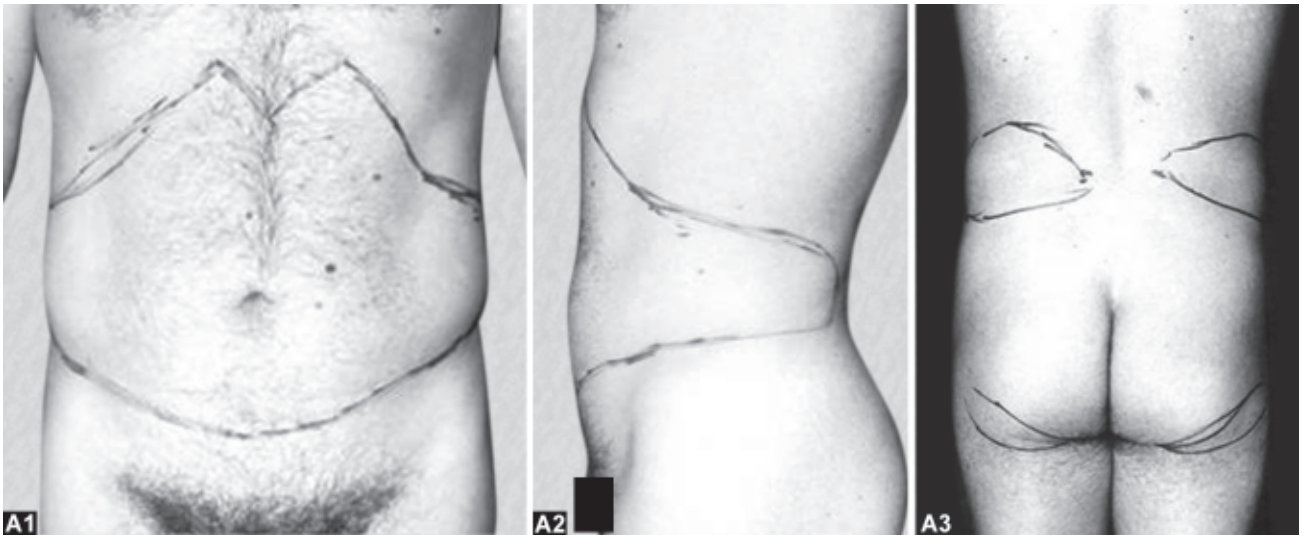
FIGURES 12-10A AND B

(A) Preoperative 27-year-old woman with abdominal lipodystrophy and poor waist definition; (B) Six months postoperative

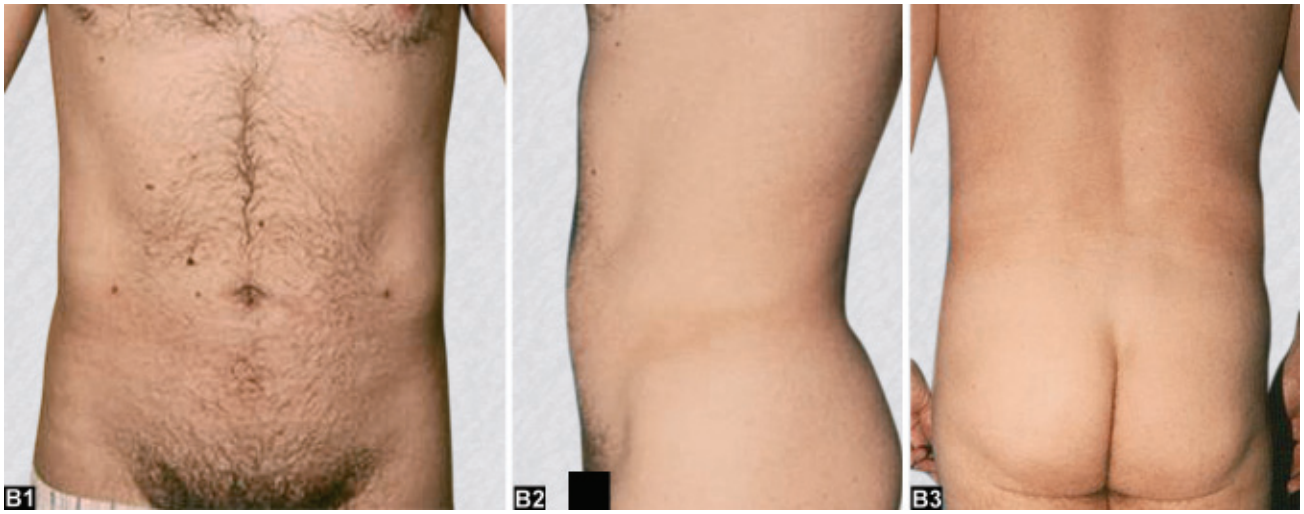


FIGURES 12-11A AND B

(A) Preoperative 47-year-old woman with abdominal lipodystrophy and poor waist definition; (B) Four months postoperative. Notice the improvement in the epigastrium



FIGURES 12-12A1 TO A3



FIGURES 12-12B1 TO B3

FIGURES 12-12A AND B

A 39-year-old male, preoperative abdominal and love handle suction. In the male the deformity is the result of excess fat deposits associated with a certain degree of collapse of the spine and consequent telescoping of the soft tissue with broadening of the thorax due to the respiratory muscles

Discussion

This technique is useful in removal of love handles. This area was never done before the era of liposuction. Male patients are the most enthusiastic in the correction of this problem since it is their first flaw when they reach middle age. In addition, it is a valuable tool in giving a waistline to women who have a Nordic type of body habitus.

Conclusion

This valuable approach is likely to develop as growing number of patients seek to correct their particular problem **(Figures 12-11 and 12-12)**.

Reference

1. Lockwood T. Lower body lift with superficial fascial system suspension. Plast Reconstr Surg. 1993;92:1112-22.

13 Iliac Crest Liposuction

Adrien E Aiache

ABSTRACT

The iliac crest area presents a common problem in women. It consists of deposits of fat just below the waist posteriorly and over the area of the iliac crest. This condition is often associated with a certain degree of obesity although in some cases it may exist without it; it presents as an objectionable protrusion of fat on a patient who has an otherwise normal body configuration. These patients are often the same ones who come for correction of saddlebags. The combination of the two problems constitutes the so-called "violin-type deformity" that is so common in the Mediterranean population. Liposuction will correct the deformity. Bleeding and flexion irregularities, dents, seroma, hematoma, and lymphorrhea may occur, however the most common problem is irregularities if the surgeon has been too aggressive in the area.

Introduction

The iliac crest area presents a common problem in women. It consists of deposits of fat just below the waist posteriorly and over the area of the iliac crest. This condition is often associated with a certain degree of obesity although in some cases it may exist without it; it is showing as an objectionable protrusion of fat on a patient who has an otherwise normal body configuration. This area contains fat relatively easy to aspirate and it gives satisfactory results.

Indications

These patients are often the same ones who come for correction of saddlebags. The combination of the two problems constitutes the so-called "violin-type deformity" that is so common in the Mediterranean population. The area of the iliac crests is to be differentiated from the flank, a problem which is more common in the males and which presents deposits at a higher level in the waist area. The iliac crest bulge is situated more posteriorly and below the waist. Patients who come in usually have a problem of excess deposits elsewhere too. Yet in some cases, it could be isolated and especially unsightly. In the past there was no treatment for this type of deformity until liposuction was discovered.

Markings and Preoperative Preparation

The patient is marked in the standing position. The most anterior and posterior zones are marked along with the upper and lower limits. The extent of the tissue to be extracted is evaluated with the patient in the standing position and while lying down. Palpation and the pinch test will be helpful. In addition, the topographic map is

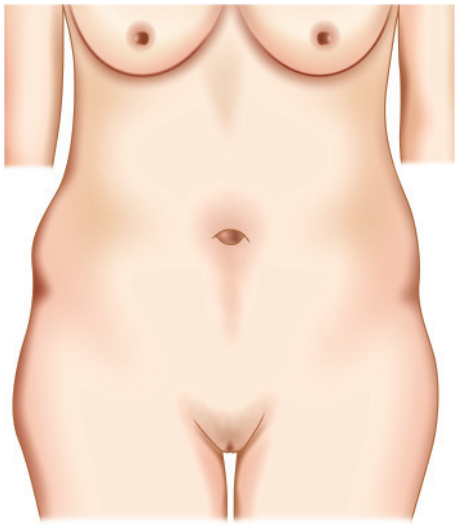


FIGURE 13-1
The iliac crest deformity gives the so-called violin-type of deformity when it is associated with the saddlebag excess

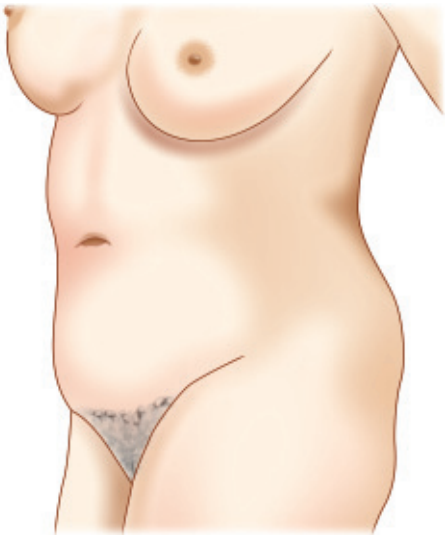


FIGURE 13-2
The iliac crest bulges were chiefly responsible for the ungraceful shape of the hips ion middle-aged women as it is shown in these drawings

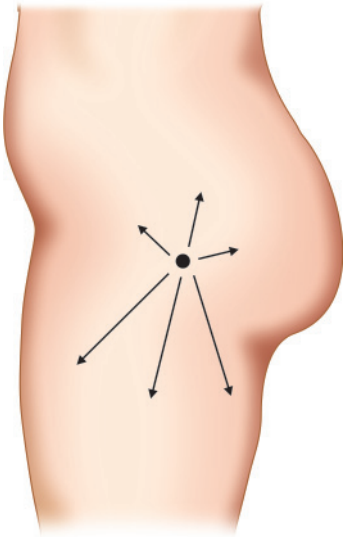


FIGURE 13-3
The iliac crest suction can be performed through a hip incision used for saddlebag suction

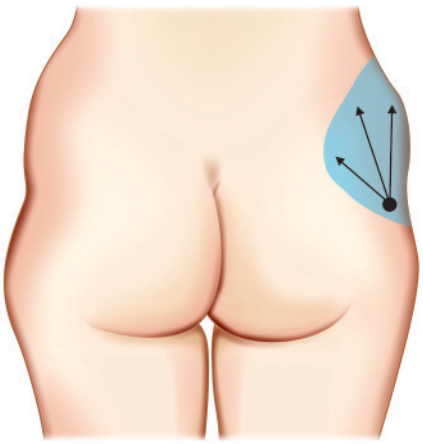


FIGURE 13-4
An excellent approach for iliac crest suction is afforded by the hip incision used in saddlebag suction

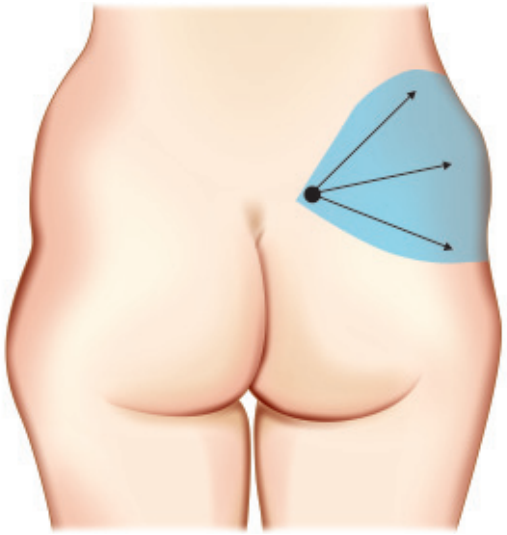


FIGURE 13-5
The preferred approach from the parasacral area allows a comfortable suction of the iliac crests. Both lateral incisions can be joined by suctioning the left iliac crest from the right incision and vice versa. This helps to correct the "twist"

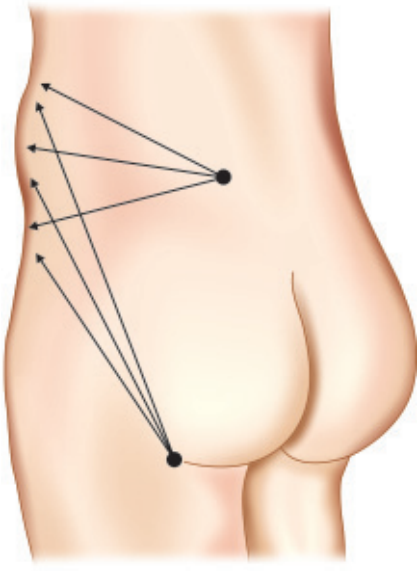


FIGURE 13-7
Crisscrossing can enhance the results of iliac crest suction from a sacral and infragluteal incision

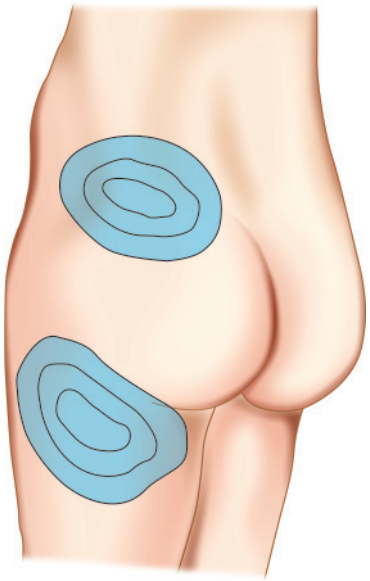


FIGURE 13-6
These two contiguous fat deposits can be suctioned through the same incision. The actual extent of the procedure is more extensive than the schema suggests

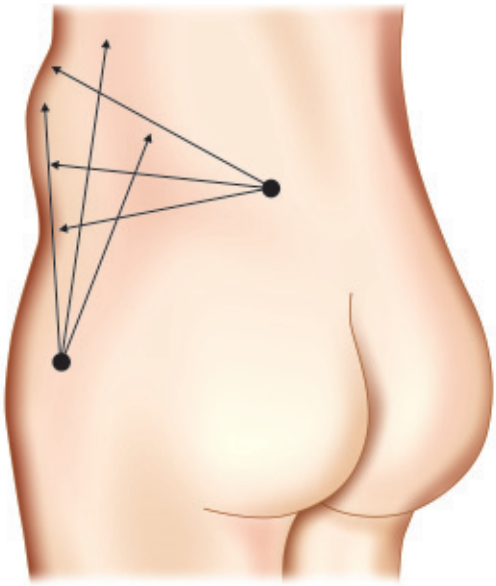


FIGURE 13-8
Crisscrossing from a hip and sacral incision

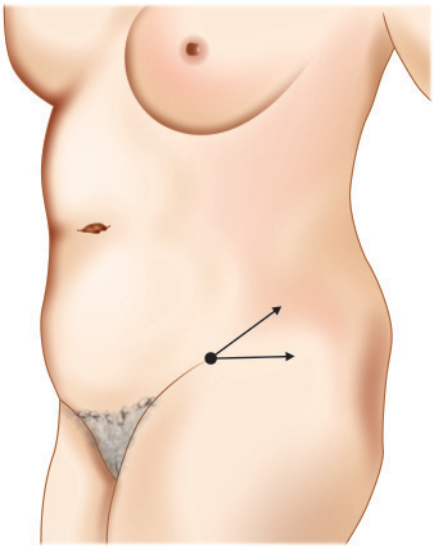


FIGURE 13-9
An anterior approach for iliac crest suction using a groin incision

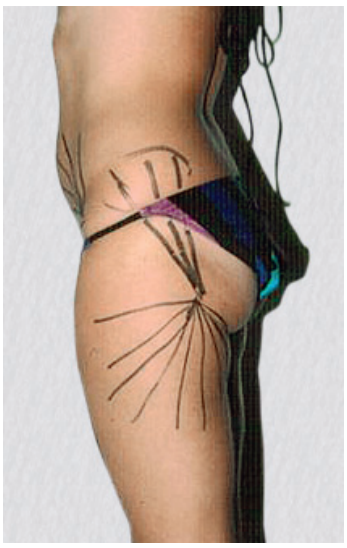


FIGURE 13-11
The outer buttock incision is useful for the hips and saddlebags and is very well hidden. A 4 mm cannula is used. Finessing is done with a 3 mm cannula. Note the avoidance of the trochanteric areas in the liposuction

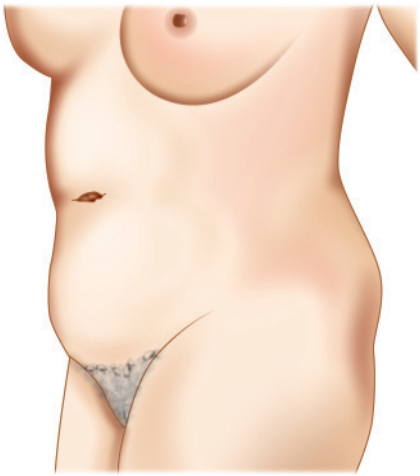
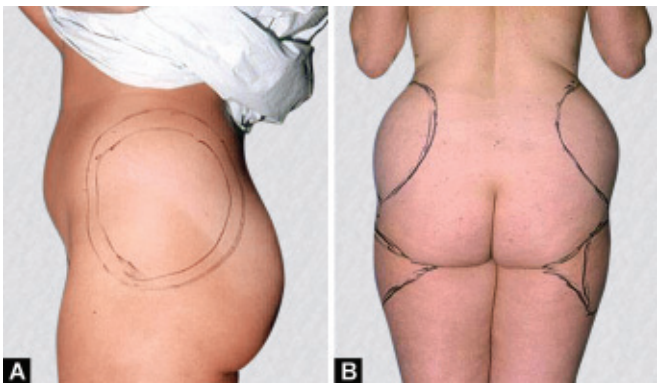


FIGURE 13-10
An anterior approach for iliac crest suction using a superior crease or a stretch mark for the incision. One can also use the lateral part of an abdominal lipectomy incision



FIGURES 13-12A AND B
Markings for iliac crest liposuction. The outer circle shows the area of feathering

FIGURE 13-13
Posterior approach. Iliac crest suction from a paraspinal incision.

used to record the thickest areas by crossing it repeatedly. During surgery, the pinch test determines the thickness of the zone and this helps in the control of the results **(Figures 13-1 to 13-13).**

Location of Incision

It is located either in a dimple situated in the lateral aspect of the iliac crest and if it is associated with saddlebag liposuction it is situated in the hip thus helping in suctioning both areas. In addition, these incisions are used for crisscrossing.

Position

The position is prone although sometimes the lateral decubitus position can be helpful. In cases of violin deformity, the surgery can be done with the patient in the prone position and the elevation of the hip allows the proper inspection of the case.

Anesthesia

It can be general if surgery is associated with other areas such as the saddlebags, buttocks or the thighs, however, in some selected cases, local anesthesia can be useful. It consists usually of the tumescent formula.

Prepping and Draping

The patient is prepped and draped in the prone position. This position limits somewhat the most anterior aspect of the area to be suctioned. Therefore, the patient will have to be rotated during the surgery in order to complete the work.

Refinements

Feathering by suction of the tissues surrounding the area helps in preventing depressions. In addition, one has to be careful not to remove an inordinate amount of fat since it could result in unsightly dimples, depressions and bumps. The refinements are done with a 3 mm cannula and a Robles cannula.

Postoperative Treatment

The wounds are closed with absorbable sutures and Steri-strips. The patient is then dressed in a garment for approximately 3 weeks. The postoperative care is the same as any suction case.

Discussion

No surgical technique was available in the past to correct this iliac crest deformity; however, since the advent of liposuction the treatment with small incisions can be extremely helpful in correcting the problem **(Figures 13-14 to 13-17)**.

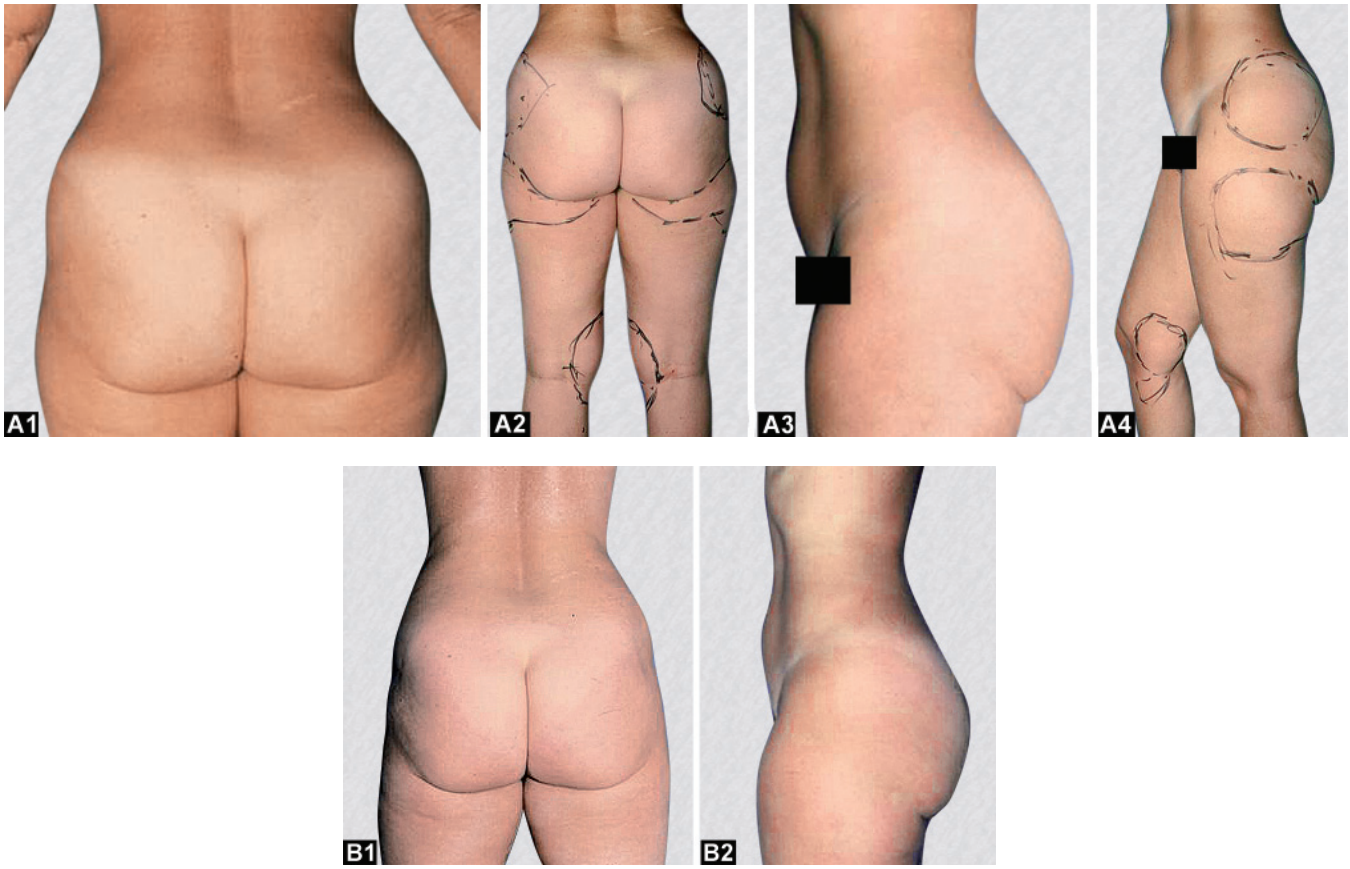
Complications

Bleeding and flexion irregularities, dents, seroma, hematoma, and lymphorrhea have been mentioned, however, the most common is of irregularities if the surgeon has been too aggressive in the area **(Table 13-1)**.

TABLE 13-1

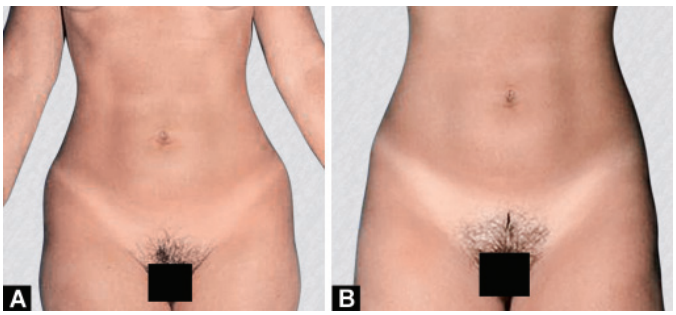
Complications of iliac crest liposuction

❖ Insufficient removal
❖ Anterior dents near the anterior iliac crest
❖ Extensive suction (more than you think) is necessary, however, be careful when you reach the anterior iliac crest
❖ Too extensive liposuction with:
– Dents
– Depressions
– Irregularities
❖ To avoid difficulties:
– Judicious suctioning
– Careful pinch test and careful observation of possible dents, depressions and step deformities



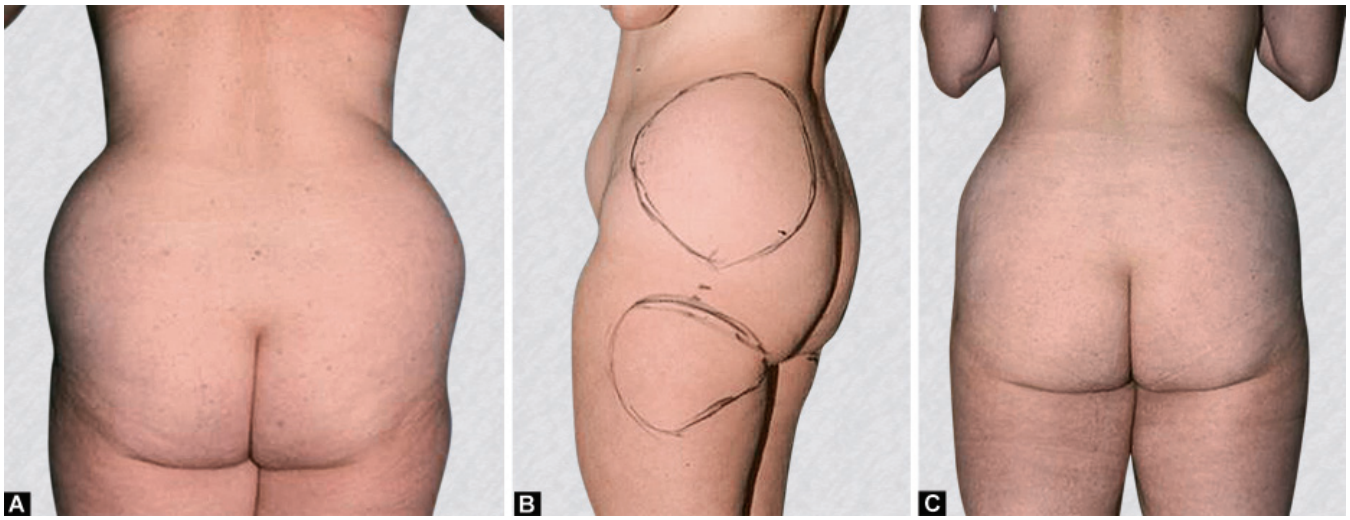
FIGURES 13-14A AND B

(A) Preoperative 34-year-old woman with iliac crest lipodystrophy associated with saddlebags and knees lipodystrophy; (B) Six months postoperative after liposuction of iliac crest, saddlebags, and knees. Note that iliac crest is visible



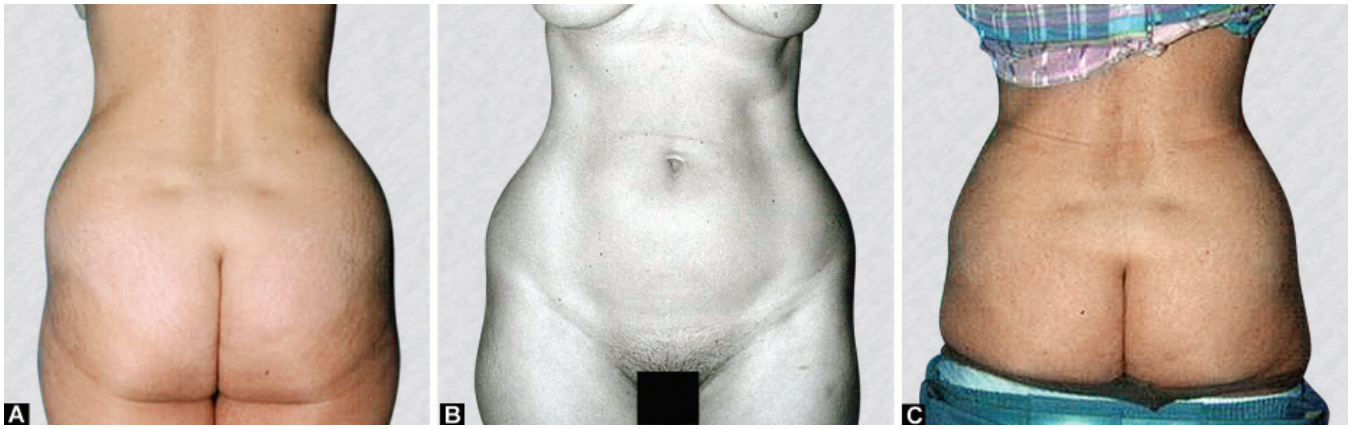
FIGURES 13-15A AND B

(A) Preoperative patient with iliac crest lipodystrophy; (B) Postoperative



FIGURES 13-16A TO C

(A) Preoperative 46-year-old woman with large iliac crests lipodystrophy. These are most visible from the back and the removal should extend to the periphery; (B) The extent of the markings showing the different zones where the suction process is to be extended in order to obtain symmetrical results is greater in view of the severity of her problem; (C) Four months postoperative. Notice the better cosmetic result on the right iliac crest



FIGURES 13-17A TO C

(A) Preoperative 35-year-old woman with iliac crest lipodystrophy; (B) In some cases the iliac crest excess will only shown in the posterior view. When very large they can be perceived from the anterior view; (C) Six months postoperative after iliac liposuction

14 Lumbar Bulge Liposuction

Adrien E Aiache

ABSTRACT

Liposuction is indicated on patients who have this excess bulge over the sacrum and around it. This excess is associated with skin redundancy in patients making this zone particularly unattractive. If superficial suction is used, there still could be redundant skin after the liposuction. One should be aware of the possibility of a spinal herniation with a form fruste of spina bifida which could be dangerous if entered. Possible complications include hemorrhage, nerve damage, infection, irregularities of the area with bumps and depressions and, although very uncommon, meningitis secondary to a traumatic perforation of the herniated dural sac. Liposuction of the lumbar area is useful. This should allow the patient to wear clothes and get an esthetic improvement.

Introduction

The exquisite beauty of the lumbar curve is seen in the female when her body is in an oblique position. The concave shape of the back just above the roundness of the gluteal redundancy has been considered particularly attractive in this decade. On male patients too, the curve is important to obtain as can best be demonstrated on athletes who have a good body definition and would like to improve on the waist and the lumbar shape exhibiting a pure muscular definition without the somewhat deforming bulges due to fat. The central sacral bulge (or twist) is also the subject of concern and in this particular case, the subject of this chapter.

Indications

Liposuction is indicated on patients who have this excess bulge over the sacrum and around it. This excess is associated with skin redundancy in patients making this zone particularly unattractive.

Caveats

Although one has to be more optimistic if superficial suction is used, the skin could still be redundant after the suction. In addition, one should be aware of the possibility of a spinal herniation with a form fruste of spina bifida which could be dangerous if entered. If it is suspicious, X-ray of the spine is indicated to rule out spina bifida with a meningocele within it.

Anesthesia

Suction of the lumbar bulge is generally difficult to perform under local anesthesia because it is tender and the strong avulsion force exerted by the suction is not easily controlled by local injections of anesthetic. General anesthesia is thus favored.

Markings

Markings are made in the standing position and the areas to be liposuctioned are carefully delineated. Secondary markings encompassing an area around it show the proper feathering.

Incisions and Technique

Incisions measure approximately 4 mm and are positioned approximately 5–6 cm lateral to the midline and 5–6 cm above the sacrum. These incisions allow proper suction of the whole zone which has been infiltrated with the tumescent anesthesia. Two incisions are useful for crisscrossing. In some cases, only one central incision can be used in the upper portion of the gluteal crease. Throughout suction, constant observation with palpation and pinch test will be used to assess the area. 4 mm and 3 mm cannulas are usually used and the finessing is done with the 3 mm cannula. The liposuction process is sometimes completed by release of the attached septa **(Figures 14-1 to 14-4)**.

Complications

Although possible, complications such as hemorrhage, nerve damage or infection have not been experienced by the author. The main and frequent complication consists of irregularities of the area with bumps and depressions. In addition, although very uncommon, a possible complication consists of meningitis secondary to a traumatic perforation of the herniated dural sac.

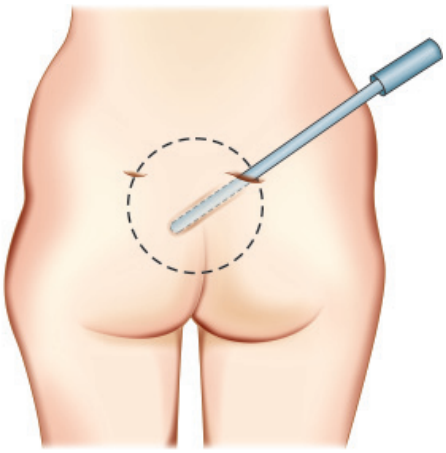


FIGURE 14-1
Two lateral incisions at the sacroiliac level allow lumbar suction and crisscrossing

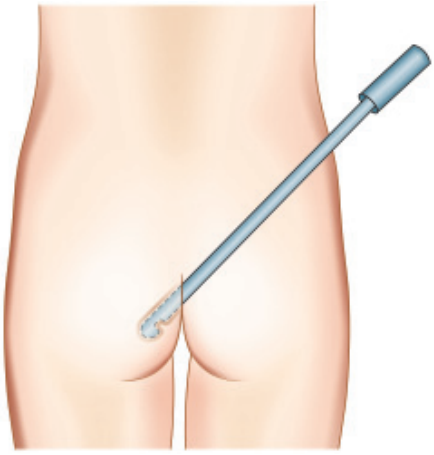
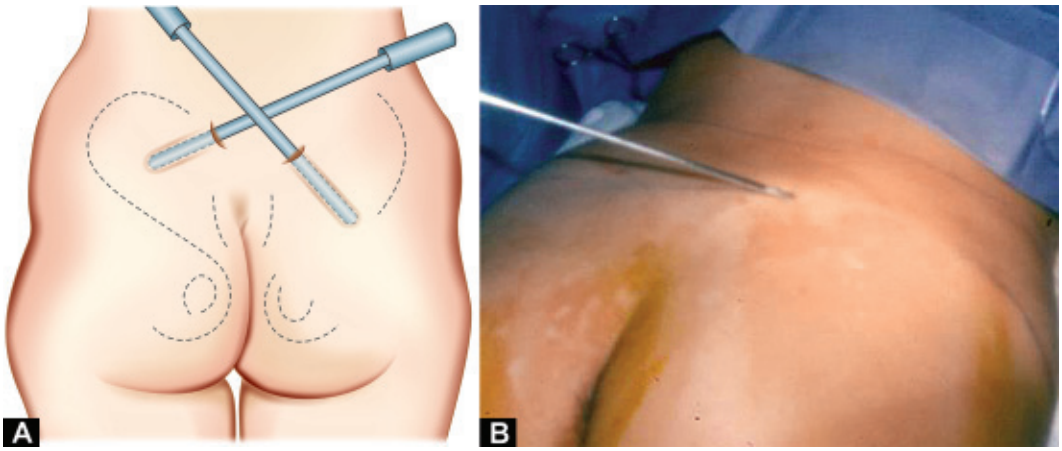


FIGURE 14-2
Liposuction of the lumbar bulge can be performed through a double parasacral incision but often is better done through a central incision placed in the upper part of the buttock crease



FIGURES 14-3A AND B
A double parasacral incision allows extension of the suction to the iliac crest

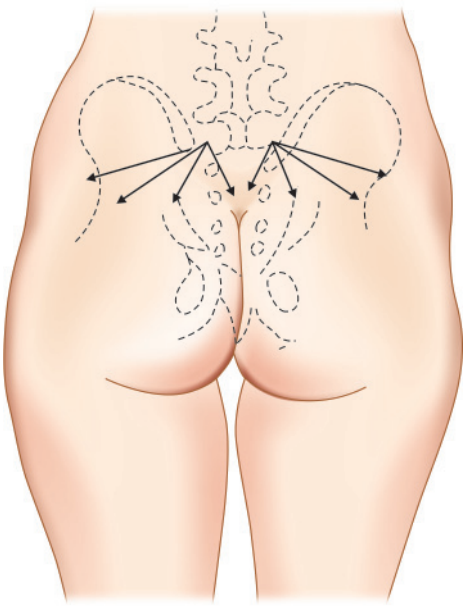


FIGURE 14-4
Crisscrossing across the midline allows complete suction of the lumbar sacral bulge

Contraindications

Cases of extreme obesity will not improve markedly. In addition, the possible meningocele would be a contraindication.

Conclusion

Liposuction of the lumbar area is useful. This should allow the patient to wear clothes and get an esthetic improvement **(Figures 14-5 to 14-8)**.

The presacral fat pads or lumbar bulge is present in many women who are not usually aware of it until the iliac crest liposuction has been done and this is usually the time when they notice their bulge. One should be aware of this fact and it is better to suction the whole area when one is doing the iliac crest liposuction thereby avoiding the postoperative complaints related to that area.

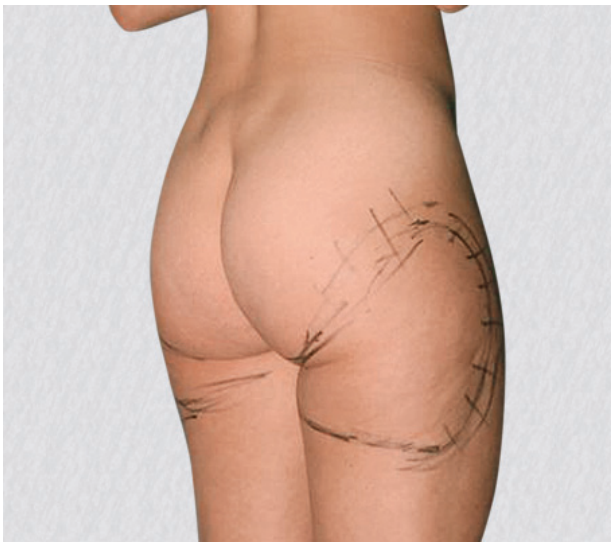


FIGURE 14-5
Lumbar lipodystrophy and the sacral bulge on this 27-year-old woman who is scheduled for saddlebag liposuction

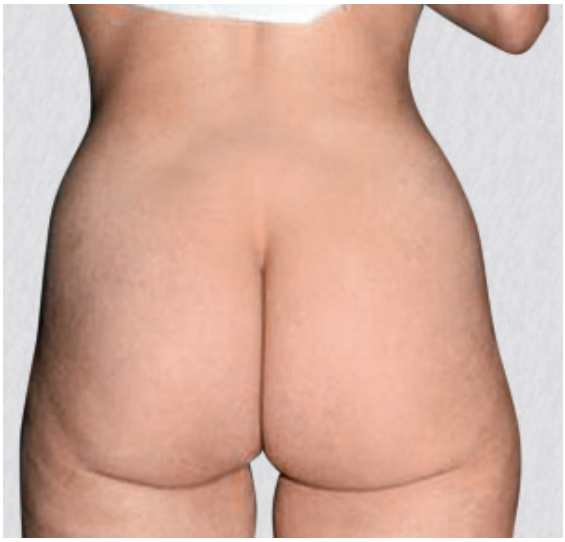


FIGURE 14-6
Large lumbar lipodystrophy on a patient who has undergone saddlebag and thigh liposuction

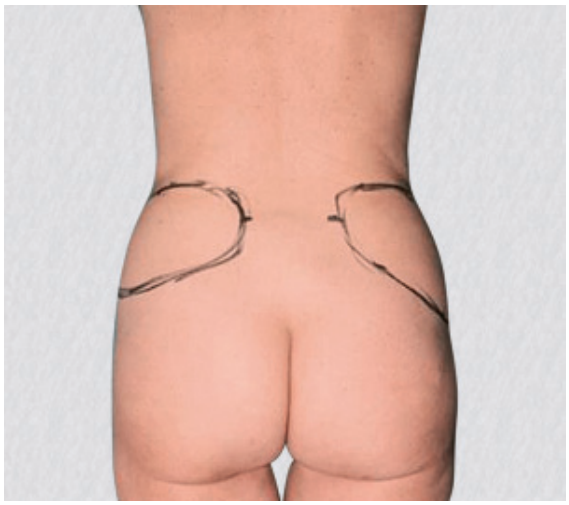
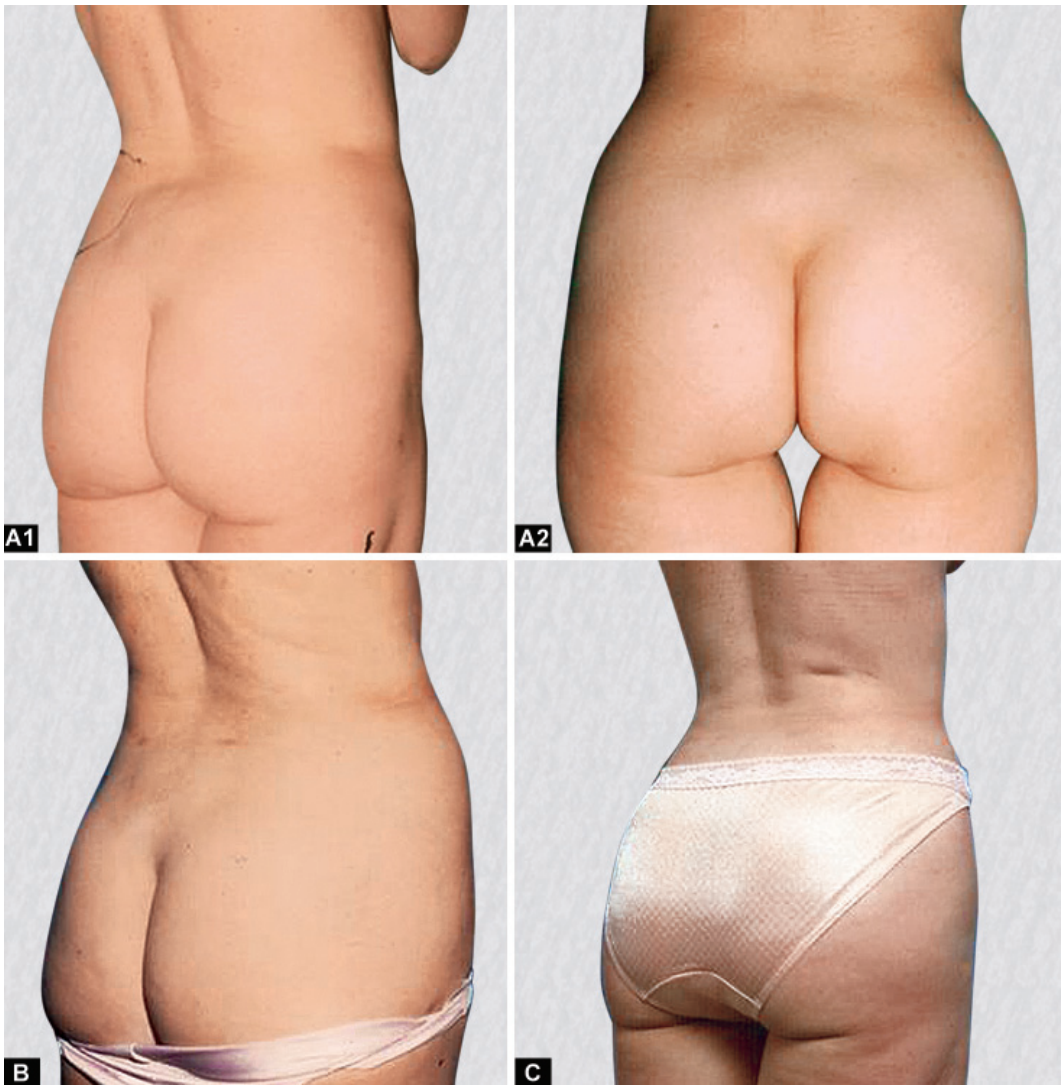


FIGURE 14-7
A 35-year-old woman with moderate lumbar and iliac crest lipodystrophy. Note that the lumbar bulges are not readily apparent in the posteroanterior position as might be in the oblique position



FIGURES 14-8A TO C

(A) Preoperative. Note the thickness of the central lumbar area and the sacral bulge. This area becomes more visible after iliac crest liposuction; (B) Postoperative shortly after lumbar liposuction; (C) Two years postoperative result showing the improvements of the lumbar suction and the curvature

15 Breast Liposuction

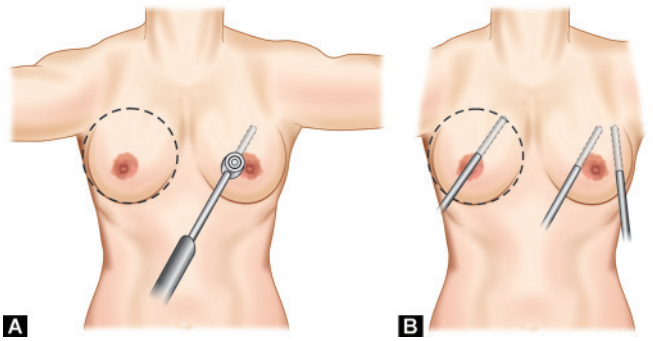
Adrien E Aiache

ABSTRACT

Previous treatment of the gynecomastia consisted of an infra-areolar incision or a complete transmammary incision allowing the approach to the desired fat and excess breast tissue. The results were often esthetically unacceptable with distortion, delayed healing, irregularities of the fatty deposits and problems in healing of the nipple as well as hemorrhage and infection. Treatment of gynecomastia, gynecomastia in the body builder, and female breast liposuction are discussed with possible complications.

Gynecomastia

Treatment of the gynecomastia consisted of an infra-areolar incision or a complete transmammary incision allowing the approach to the desired fat and excess breast tissue. The results were often esthetically unacceptable with distortion, delayed healing, irregularities of the fatty deposits and problems in healing of the nipple as well as hemorrhage and infection. Favorable postoperative esthetic results were very difficult to obtain. Smoothing the chest wall was also very difficult and patients often had to endure dished-out chest walls with waves, irregularities and other problems at the junction of the operated area with the surrounding tissue. Liposuction has been useful in reducing the fat excesses involved in the gynecomastia, however, it has not been sufficient by itself since the excision of the glandular portion in the gynecomastia can only be done by sharp excision. It is wrong, then, to think that gynecomastia can be treated by liposuction alone **(Figures 15-1A and B)**.



FIGURES 15-1A AND B

Gynecomastia incision performed in the infra-areolar skin junction allows the liposuction process to be applied to the whole mammary mound. Note the extent of the undermining occupying the anterior chest. This is performed only after the mammary gland (in the stippled circle) has been excised totally

Markings

The patient is marked in the standing position marking the infra-areolar incision and the area of fat to be removed. When the patient is in a standing position,

FIGURE 15-2

Large bilateral gynecomastia on a 46-year-old male. Treatment consists of skin excision in addition to gland excision, especially on the left breast with additional liposuction around it

proper evaluation of the padding of fat present on the chest wall is possible. Note that some patients will present excessive gynecomastia with an excess of skin giving an appearance similar to a female breast **(Figure 15-2)**, however, other cases with minimal fat will consist of an increase in the glandular mound under the nipple and around it. An exact marking of the area will help in determining the results to be obtained. The pinch test is very helpful and very telltale since it is always possible to pinch the soft tissue on top of the gland and by a wider pinch to get the glandular tissue under the fat. This pinch test is done with a variation from the regular pinch test since it will tell the volume of the gland which is surrounded by fat.

Surgical Technique

Anesthesia is usually general; however, local anesthesia can be given when the amount to remove is relatively small. Tugging from the suction is always uncomfortable and the patient will be held with difficulty during the surgery. Once the local anesthesia has become effective, an incision is made in the areola and sharp dissection is necessary dissecting the skin away from the glandular portion of the gynecomastia. This is done in the routine surgical fashion of doing a mastectomy by freeing the gland from the fibrofatty tissue around it. Once the skin has been completely undermined over the gland, the gland is then grasped and with strong retraction laterally the gland is then dissected away from the pectoralis fascia using mainly sharp and blunt dissection. Laterally, the gland ends up in the mid-axillary line area where bleeding can be encountered if the dissection of the gland enters the tissues below it and it does not stay in the right plane. At the end of the excisional part of surgery, liposuction is performed around the zone to obtain a smooth transition with the nonoperated area and at this point a 4 or 3 mm cannula can be used safely.

Closure is accomplished by reapproximation of the skin to the pectoralis muscle by a basting stitch going as distal as possible to prevent hematomas from filling the undermined area. There is a large dead space which readily fills with blood and fluid. Closure is done over a drain for comfort. Postoperative care consists of prophylactic antibiotics, pain medication, constraining the chest wall with elastic bandages and approximately a 3-week period of rest to prevent the pectoralis muscle from tearing away from the skin.

Conclusion

Liposuction of the gynecomastia cases is useful as an adjuvant after the surgical removal of the glandular portion of the gynecomastia.

Gynecomastia in the Body Builder

Surgical Treatment

The surgical treatment of gynecomastia has evolved from the technique of subcutaneous mastectomy to the new method of liposuction associated with gland excision **(Figures 15-3 and 15-4)**.

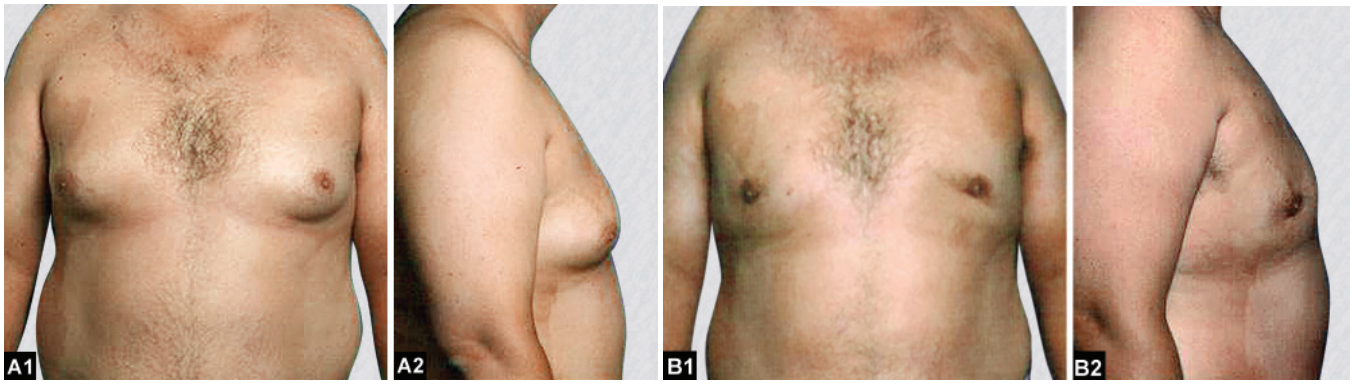
This approach is indicated for adolescent and middle-aged men who have a combination of gland and fat hypertrophy.

In the body builder, and especially those taking anabolic steroids for muscle mass increase, the surgical treatment has different characteristics.

Gynecomastia in the body builder is the direct result of the prolonged and repeated intake of anabolic steroids such as methandrostenolone (Dianabol), stanozolol (Winstrol) and nandrolone decanoate (Decad-Durabolin). Other anabolic steroids taken in tablets are oxandrolone (Anavar) and oxymetholone (Androl-50). More medications are developed in using these derivatives.

The intake of anabolic steroids and the deleterious effects of these medications have been thoroughly researched. Their use is banned in most athletic competitions.

The patients complain of breast enlargement they perceive during their training program. The enlargement is not noticed at first by the patient who fails to



FIGURES 15-3A AND B

(A) Preoperative fatty gynecomastia in a 36-year-old man who has general obesity; (B) Postoperative following breast excision. Note the unsatisfactory result obtained without liposuction in this case

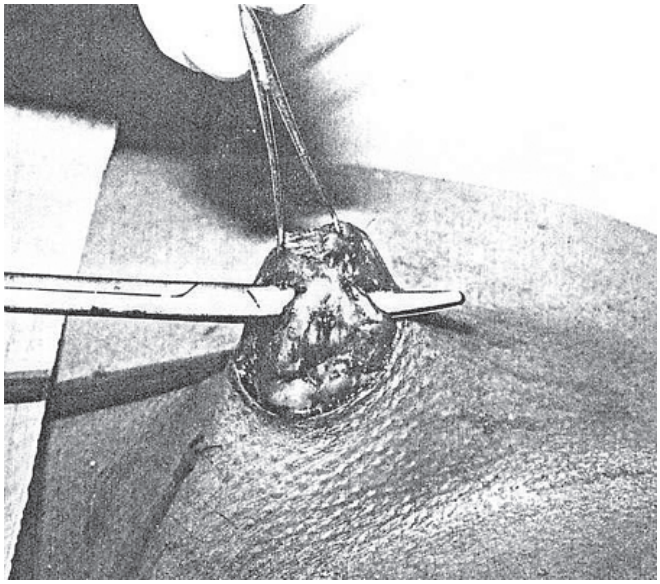


FIGURE 15-4

Through circumareolar incision, the skin of the nipple is raised and the terminal portion ends of the galactiferous ducts are cut leaving a thickness of 6–8 mm

distinguish it from the increase in muscle size (pectoralis major and minor). The gradual enlargement of these muscles seems to mask the concomitant enlargement of the breast tissue. However, as the shape of the muscle improves, the athlete discovers that his breast shape has become distorted and has a shape not connected to the muscle growth. In repose, the nipple droops looking down and sits at the top of a soft mound present over the lower edge of the pectoralis major muscle. During contraction of the muscle, the shape of the muscle is distorted and does not appear sharply defined since it is overshadowed by the softness and the pyramidal shape of the breast tissue on top.

No suspicious masses are found on examination of these patients and the condition is found bilaterally in all cases. A thin layer of fat is palpated although in some of these patients not strictly involved in body building, a thicker layer of fat may be present. Laboratory tests should include a fibrinogen count which can be low in some patients thereby increasing the chances of operative and postoperative bleeding.

As a routine, patients are told to abstain from taking these steroids for at least 2 months preoperatively.

Treatment

The treatment consists of the removal of the whole mammary gland present below the nipple and over the pectoralis major.

Anatomy

The anatomy shows that the mammary gland has the exact extension in its development as in the female. The base of the gland reaches up to 2 inches from the clavicle, goes to the mid-axillary line and approximately 1 inch from the midline of the sternum in addition to approximately 2 inches below the nipple. This gland is present in all cases and when it enlarges, it enlarges more conspicuously immediately under the nipple-areolar complex, however, it is present in all cases all over the chest wall and its enlargement can be extreme, making it sometimes difficult to extirpate in one fragment from the small incision. This gland has a very firm consistency which does not respond to treatment such as ultrasound or even the sharp curette which only will curette some of the surface of the gland leaving the major part behind **(Figure 15-4)**.

This anatomical fact explains why the concept of treating gynecomastia with either plain fat suction with curette or ultrasound is not acceptable and does not reflect reality.

Anesthesia

Anesthesia is general or it can be local in some cases where the patient is able to accept the pain associated with a very large surface extirpation of the gland.

Incision

The favored incision consists of a semicircular infra-areolar incision at the junction of the areola skin and breast skin. Rarely, an axillary incision or a horizontal nipple incision is used. In cases where the nipple is ptotic, the surgery will then consist of an elevation of the nipple on a crescent type of excision with a good vascular base for the ellipse of the nipple since it could end up in nipple necrosis if the circulation is not adequate. In other cases where the enlargement is dramatic, the only type of incision is similar to the incision used in mastopexies and consists of an inverted T scar with some circumareolar excision, however, assuring that there is enough circulation to the nipple-areolar complex.

Technique

The incision is made through the subcutaneous tissue, then undermining is performed over the mammary gland with Metzenbaum scissors using a technique similar to the subcutaneous mastectomy technique used by general surgeons. The extent of undermining is predetermined by the skin markings. It goes approximately 2 inches below the clavicle, 1 inch from the midsternal line, in the midaxillary line, and 2 inches below the areola in the inframammary area. Care must be taken to leave a layer of fat below the skin in order to preserve the skin flap circulation and chest contour.

At the level of the nipple, the lactiferous ducts are sectioned leaving 6–8 mm of thickness to the nipple. This nipple-areola left behind is the only mammary gland that should be left behind after the mastectomy. The mammary gland is then grasped with a tenaculum and retracted laterally while the assistant retracts medially. At this point, the dissection of the mammary gland is performed with sharp and blunt dissection freeing it from the pectoralis fascia situated below it. A combination of sharp and blunt dissection from the pectoralis fascia is used until the gland is freed from medial to lateral. Laterally, the junction with the axillary and midaxillary line tissues is performed freeing the gland and leaving the pectoralis muscle, the external oblique and the serratus behind as well. The whole specimen is removed in one unit. In very big builders, the gland is situated on very large muscles with a very generous circulation and hemorrhage is relatively common. Hemostasis should be extremely careful. Sometimes, the whole specimen measures 8–10 cm in diameter and up to 2–3 cm in thickness. This large amount of breast tissue is very different from the amount found in middle-aged or adolescent male gynecomastia excision where there is a large component of fat associated with a smaller gland.

The breast pocket is closed with a few rows of sutures coapting the skin to the pectoralis fascia in order to avoid large dead space and to limit the size of eventual hematomas. Compressive bandages are used for 2–4 days.

Quite different from the new tendency towards liposuction, this surgical technique is similar to the one performed for female subcutaneous mastectomy and it is involves removal of the whole mammary gland. Drains are left at the corner of the wound for approximately 48 hours and up to 4–5 days if necessary **(Figures 15-5 to 15-7)**.

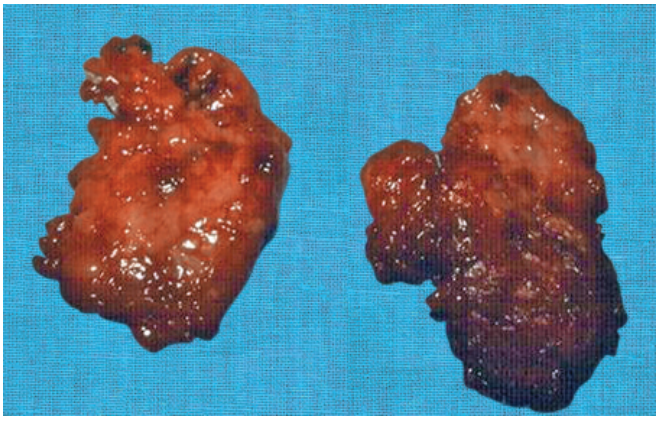


FIGURE 15-5

The mammary gland occupies most of the chest wall and increases uniformly in the body builder. The size of the gland is 12 x 16 x 2 cm

Pathology

Pathologic slides taken from different areas of the gland show essentially a composite of breast parenchyma interspersed by typical breast ducts which are more common than the breast parenchyma. The fat is situated above and below the gland, however, it is not found in the gland itself.

FIGURES 15-6A AND B

(A) Preoperative 26-year-old man with gynecomastia; (B) Eight months postoperative

FIGURES 15-7A AND B

(A) Preoperative 26-year-old male with gynecomastia of long-term duration; (B) Postoperative at 8 months. Note the left breast is still somewhat swollen and distorted due to a hematoma. This was treated by repeated aspiration with a large gauge needle

Complications

Breast hemorrhages necessitate reopening and hemostasis. Hematomas necessitate only needle aspirations. No infections, skin slough or chest wall distortion has been observed. Although liposuction is recommended by some, in the body builder it is not necessary, or if there is some fat, only the circumference of the excised area has to be suctioned.

Conclusion

1. Gynecomastia in the body builder is secondary to anabolic steroid intake.
2. There is an increased risk of hemorrhage in these patients who have very large vessels in conjunction with very large muscles, and specific techniques obliterating dead space associated with extremely careful hemostasis is necessary.
3. No fat removal has been found necessary nor advised in these patients.
4. The conclusion drawn by this work seems to suggest that extremely large mammary glands are present, in an undeveloped form, in all male patients and it only develops to visible extent in body builders on steroids. This indicates the necessity of performing large extensive glandular resections in cases where it might not be suspected.

Cases of breast carcinoma, although present in 1–100 breast cancers has not yet been found by the author.

Female Breast Liposuction

Incisions

- Medial inframammary
- Lateral inframammary
- Periareolar
- Axillary

Instruments

- 4 mm cannula
- 3 mm cannula

Anesthesia

- General
- Local for small reduction

Although many techniques of mammoplasty have been developed, none has solved satisfactorily the problem of excesses in the medial and lateral part of the breast and the excessive protrusion of the tail of Spence in the axilla. Even in using the inferior pedicle technique, the mammoplasty alone is often insufficient and additional procedures such as suction are necessary to improve the total picture. All the different mammoplasty techniques are short of being satisfactory in removing the fat unless liposuction is performed.

Isolated liposuction for breast reduction has been developed since quite sometimes. The author himself has been the first to describe the liposuction on the tail of Spence, the medial and lateral fat deposits, because the total breast liposuction was not satisfactory in a large percentage of cases. The isolated breast reduction by suction is limited to cases that will improve without skin reduction on patients who are not eager to have the scars of breast reduction. The suction breast reduction is remarkably simple in some cases and is usually a satisfactory procedure when performed on the right patients.

Indications

Specific indications are limited to patients who have a nipple-areolar complex that is esthetically well located since the technique will certainly not elevate the complex. In addition, indications are on people who have mainly fatty overdevelopment. The fat tissue can be easily aspirated as opposed to breast tissue.

Secondary indications are patients who have already had a reduction mammoplasty and are eager to reduce further their breast size, however, will probably be happier if no additional scar incision or excision can be given. These cases will respond well to a pure liposuction reduction through already existing scars.

Markings

Markings are either made in old scars from reduction or if they are new, they should be made as a small mark either in the axilla in the medial or lateral submammary fold, and sometimes in the infra-areolar skin junction. The breast tissue for liposuction does not have to be marked since it is visible, and the only markings to check are the circumference of the breast and the possible excesses medially and laterally **(Figure 15-8)**.

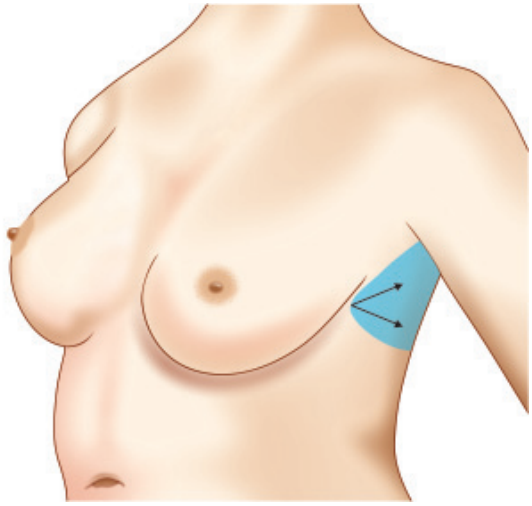


FIGURE 15-8

From the outer inferior incision liposuction can be performed on the whole chest wall

Instruments

4 mm and 3 mm cannulas are easier to use. In addition, the Becker cannula can be utilized to try to remove some breast tissue, however, in the author's opinion it is not an adequate technique for breast tissue reduction.

Anesthesia

Anesthesia is mainly general, however, in limited zones, local anesthesia can be used on patients who are able to withstand some pain.

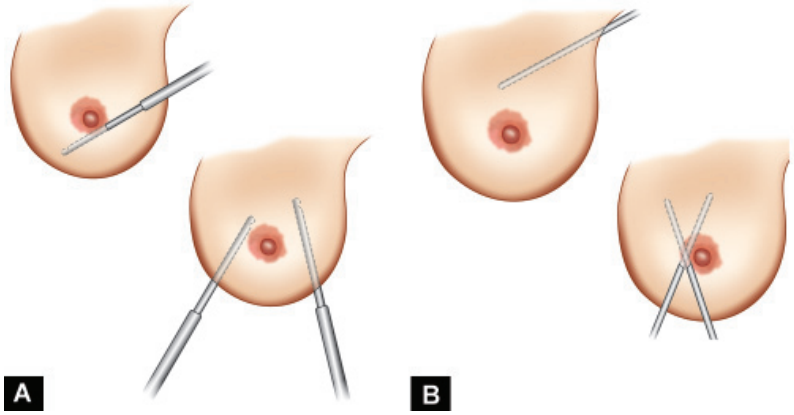
Technique

The usual technique of to-and-fro liposuction is used in these cases. The breast is carefully divided in different

portions to be able to suction without missing any spots. If the introduction of the cannula is difficult, only the areas that can be done easily are performed and this is the limiting factor in pure suction of the breast. Usually older females with more fat and less breast tissue are amenable to this type of procedure, especially very large fatty breasts. If the surgeon decides to go ahead with the planned mammoplasty reduction by any technique, it is then possible after the suction period to continue with the breast surgery and at the completion of the reduction by surgery, additional liposuction is performed in these areas an "open sky" technique for complete fatty removal **(Figures 15-8 to 15-17)**.

Refinements

Refinements are done especially in the lateral and medial wall areas and this is done using a smaller cannula.



FIGURES 15-9A AND B
The incision can be drawn at the outermost portion of the inframammary incision; it can be done either at the start of the procedure or at the finish. The multiple spokes are liposuctioned-out in a fan shape, fanning laterally

FIGURE 15-10
Postoperative patient after reduction mammoplasty who still exhibits a fatty fullness of the lateral chest wall

FIGURE 15-11
Postoperative reduction mammoplasty marked for secondary reduction of the lateral roll (same patient)

FIGURE 15-12
Secondary liposuction performed for the lateral roll in a case where reduction mammoplasty was done previously

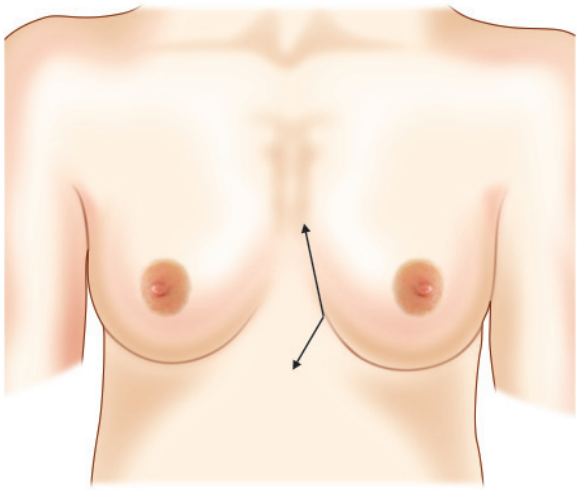


FIGURE 15-13
The medial fatty excesses are suctioned through a medial approach through the inframammary scar

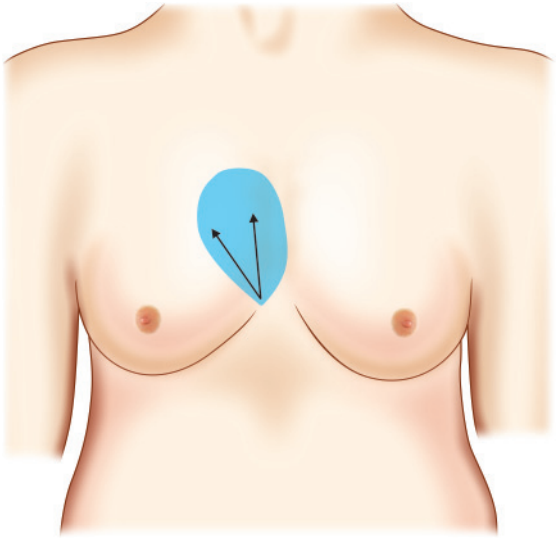
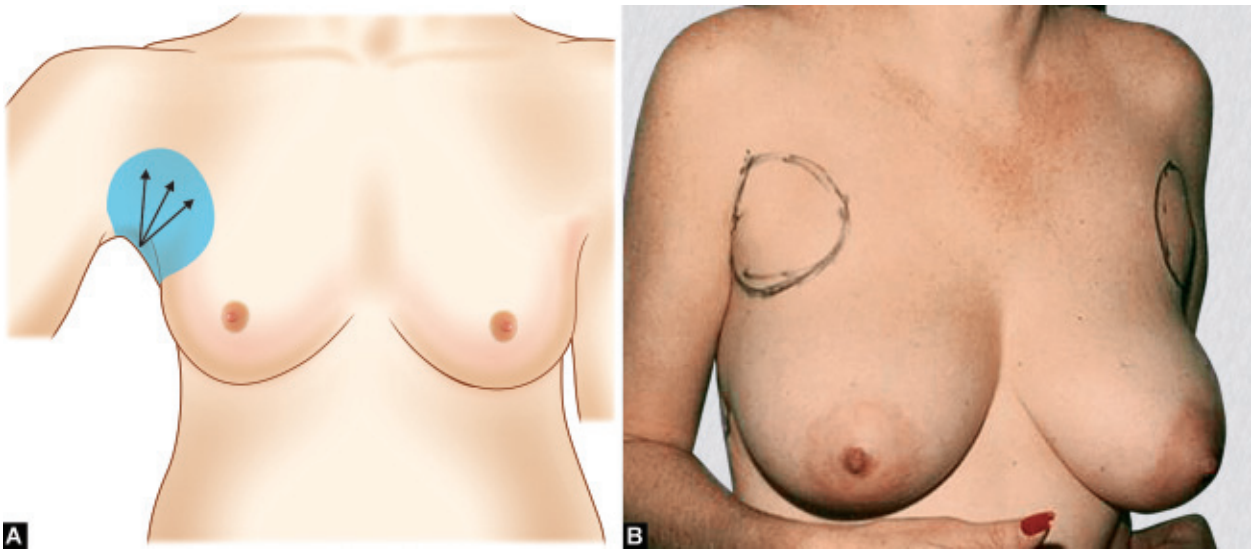


FIGURE 15-14
Breast symmastia. The extent of liposuction can improve the problem only to a limited degree since the skin fold will sometimes not drape well on the new chest contour



FIGURES 15-15A AND B
The "tail of Spence" liposuction is performed through the axilla in any number of directions

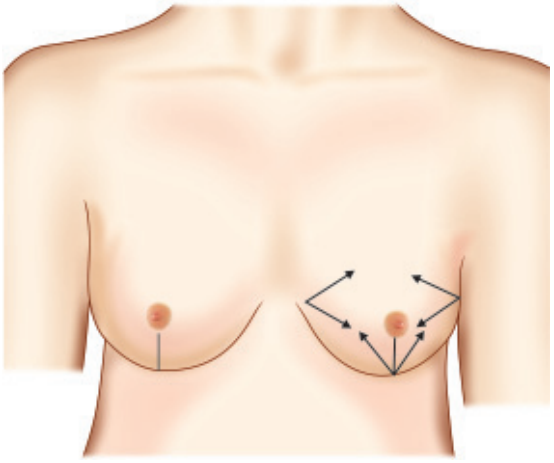


FIGURE 15-16
Size reduction at the time of reduction mammoplasty will avoid additional surgery and often shorten the inframammary scars

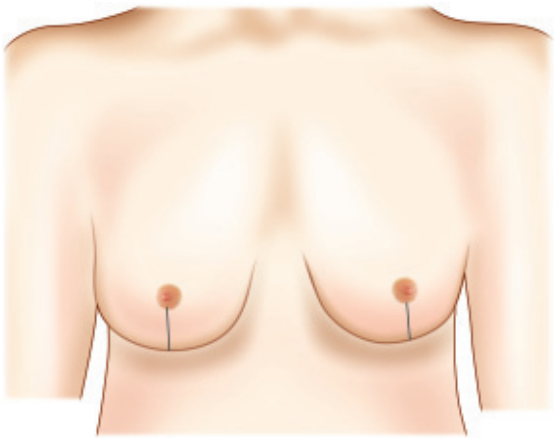


FIGURE 15-17
The whole breast mound is liposuctioned resulting in an overall reduction in size

Dressings

The areas of suction are cleansed and a compressive bandage is applied with a compressive bra. Prophylactic antibiotics and pain medication are routinely given.

Sequelae

Chest bruising can be extensive and can last for a few weeks. Numbness of the areas of suction disappears in few weeks. Complications of tape burns are due to the Elastoplast or tape and bleeding is usually uncommon. Nipple and inferior wound dehiscence and necrosis is uncommon.

Discussion

This liposuction technique is found useful in either complementing the techniques of reduction mammoplasty or as a solo procedure for reduction of a fatty breast. In cases where an unsatisfactory appearance has been obtained by surgery, the liposuction can often sculpture the breast mound as desired.

16 Breast Reduction Combined with Liposuction

Adrien E Aiache

ABSTRACT

Although many techniques of mammoplasty have been developed, none has solved satisfactorily the problem of excesses in the medial and lateral part of the breast as well as the overall reduction of breast tissue when a large amount of fat is present. The excessive protrusion of the tail of Spence in the axilla is also a difficult area. Although some skin retraction can occur with liposuction, the patient should be warned about the inability to remove the dog ears by liposuction in addition to the occurrence of irregular depressions in the lateral wall of the breast. Liposuction of the breasts is a satisfactory adjuvant in the breast reduction technique.

Liposuction

Although many techniques of mammoplasty have been developed, none has solved satisfactorily the problem of excesses in the medial and lateral part of the breast as well as the overall reduction of breast tissue when a large amount of fat is present. The excessive protrusion of the tail of Spence in the axilla is also a difficult area.

Even in using the inferior pedicle technique, mammoplasty alone is nevertheless insufficient and an additional procedure such as suction is necessary. The improvement is done in the breast tissue itself during the reduction or before it, and at the end of the reduction, the suction is used medially, inferiorly, laterally and superiorly to improve the borders of the breast tissue. Another advantage of using suction is that symmetry can be obtained; this is often difficult with surgical techniques alone.

Indications

Obese patients who present large breasts are prime candidates for liposuction since they exhibit fat excesses in and around the breasts themselves.

Patients who have a mild degree of symmastia are also candidates for medial liposuction through the inner portion of the inframammary fold.

The tail of Spence is also an indication for liposuction providing that no breast tissue *per se* is present since it is impossible for the suction process to extract breast tissue.

Note that the lateral thoracic roll is the most common deformity in obese patients and the one most satisfactorily treated by liposuction **(Figures 16-1 to 16-3)**.

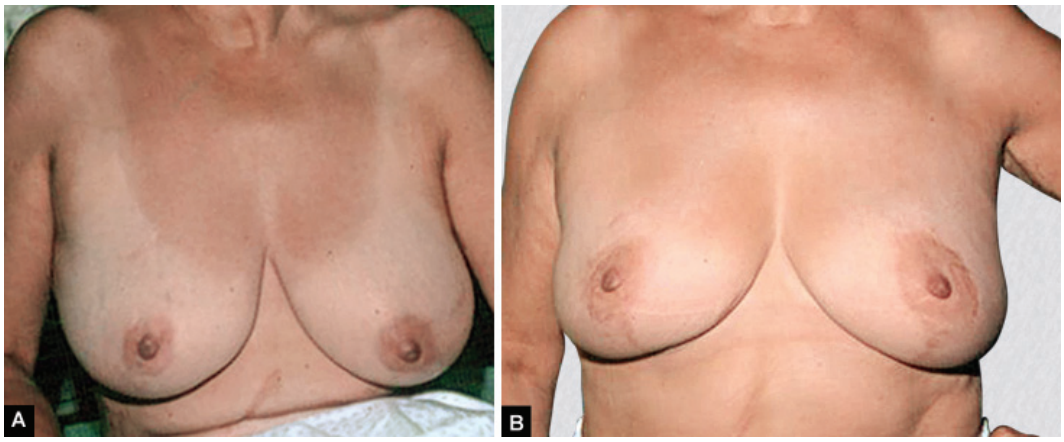
Finally, the size of the entire breast can be reduced by liposuction alone if the breast mound consists mainly of fat and has little breast tissue; this is most often seen in older women.

Caveats

Although some skin retraction can occur, the patient should be warned about the inability to remove the dog ears by the technique of liposuction in addition to the

FIGURES 16-1A AND B

(A) Preoperative 54-year-old woman with breast hypertrophy and ptosis. Note the lateral fat bulge near the axilla; (B) One year postoperative



FIGURES 16-2A AND B: BREAST SUCTION LIPECTOMY

(A) Preoperative patient. In large patients, the liposuction process is used medially, laterally, and superiorly through different incisions; (B) Postoperative. To avoid the square appearance of the breasts, suction lipectomy of the medial and lateral ends of the breast will be useful in reduction mammoplasty

occurrence of irregular depressions in the lateral wall of the breast.

Although the achievement of symmetry is of importance, patients should be warned of the possibility of ending up with asymmetrical sizes.

One important factor is the fact that suction alone cannot elevate the nipple and if the nipple has not been properly elevated to a new level, suction will not help in achieving the desired results.

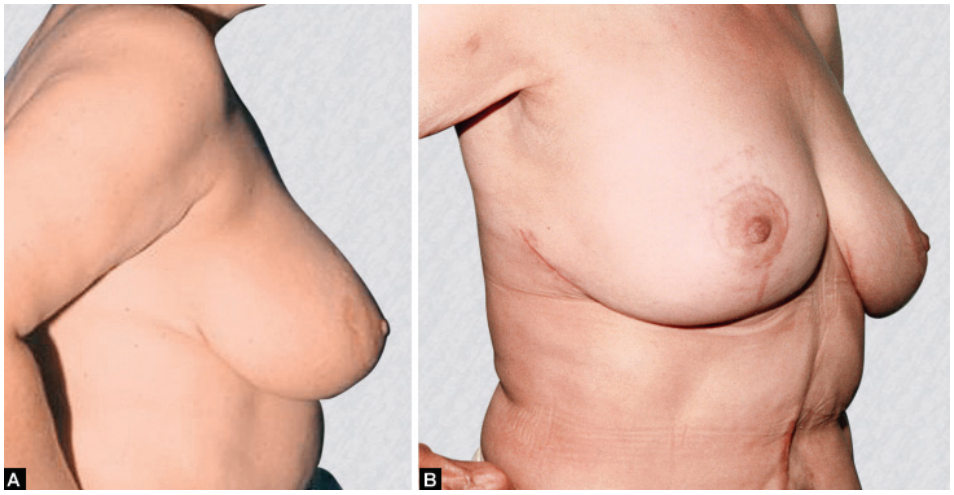
Markings

Breast excisions are marked according to the elected technique for mammoplasty in the standing or sitting-up position. The inferior submammary scar is marked and can often be shorter when liposuction is used as an adjuvant.

The marking of the fatty excesses is made either medially, superiorly or laterally to facilitate the surgery. The pinch test is useful especially laterally to compare the real excess of fat with the normal thoracic thickness of the remaining portion of the chest. Extreme attention is given to the markings and the actual positioning and shaping of the breasts in order to assess the exact area of suction to be performed in addition to the surgical procedure.

Anesthesia

In cases of moderate breast hypertrophy and fat excess, local anesthesia is adequate.



FIGURES 16-3A AND B

(A) Preoperative 54-year-old woman with breast hypertrophy of a fatty nature and large thoracic rolls; (B) Eight months postoperative shows improvement in the thoracic roll

Although the surgical reduction seems to respond well to local anesthesia, the suction procedure is often less tolerable because the strong aspiration of fat tugs on the thoracic muscle fibers. General anesthesia is used in larger breasts and it is complemented by the diluted solution of xylocaine and epinephrine.

Technique

Liposuction is often started before the reduction procedure making the surgery easier and the surgical excision less extensive. Otherwise, "open sky" suction is performed in order to "clean" the wound edges and the irregular areas of excess fat present in the remaining breast segments after the reduction. This technique is not very traumatic and spares most of the larger vessels.

After closure of the breast edges, sometimes the suction can be used again to improve areas that need it, especially the most common such as the lateral chest wall, the medial protrusion, and the tail of Spence. A 4 mm or 3 mm cannula is often the preferred instrument. The result of liposuction is constantly checked during the procedure by the pinch test and the roll test.

Refinements

Liposuction is performed in the lateral chest and the medial chest area. Feathering is accomplished in all these zones surrounding the liposuction to obtain a smooth transition with the untouched areas.

Dressings

The areas of suction can be taped, however, a bra is the best garment and it is held by a circumferential Elastoplast.

Sequelae and Complications

The chest bruising can be extensive and can last a few weeks. Numbness of the areas suctioned usually disappears within a few weeks. Complications have been tape burn due to the Elastoplast, bleeding, and rarely infection. Nipple and inferior mound dehiscence and necrosis is uncommon although it can be found in any cases of reduction mammoplasty and especially when it is associated with fat liposuction.

Discussion

The liposuction technique is extremely useful in complementing the techniques of reduction mammoplasty. In cases where an unsatisfactory appearance is obtained, the suction can often sculpture the breast mound as desired. With this technique in mind, the surgeon can shorten the inframammary scars and rely on the suction process for release of tension of the wounds by reducing the actual volume of the breast mass.

Conclusion

Liposuction of the breasts is a satisfactory adjuvant in the breast reduction technique.

17 Back and Scapula (Upper Back and Thoracic Rolls)

Adrien E Aiache

ABSTRACT

The thoracic roll is a condition that has a combination of skin rolls with fat excess. It is thought that these thoracic posterior rolls consist of an accordionization of the posterior thoracic skin due to skin relaxation with aging and fat excess. The rolls usually number three and are interspersed by valleys, representing adhesions of the skin to five or six points at the level of the deep fascia. The usual patient is a middle-aged woman with a slight weight problem or a more severe one, especially in the torso. The techniques of liposuction of the areas of the thoracic roll, flankplasty, hip lift, and Dowager's hump are discussed with possible complications.

Upper Back and Thoracic Rolls

A concept of understanding the thoracic roll is devised as a condition that has a combination of skin rolls with fat excess. It is thought that these thoracic posterior rolls consist of an accordionization of the posterior thoracic skin due to skin relaxation with aging and fat excess. The rolls usually number three and are interspersed by valleys, representing adhesions of the skin to five or six points at the level of the deep fascia. Some improvements are feasible by suction alone. A technique of sharp dissection of the adhesions of the valleys is necessary to obtain proper improvement and release of these adhesions. This liposuction of the back and subscapular area is relatively new in the liposuction techniques. Without it, there would not be any available treatment for improvement of an unsightly back and lateral thoracic area. This area is often asked about by women who are concerned about their appearance in low-cut dresses, bathing suits or even leotards.

Indications

The usual patient is a middle-aged woman with a slight weight problem or a more severe one, especially in the torso. In addition, with this accumulation of fat there is often skin excess. The back is then occupied by a couple of large "waves" or fatty rolls. This area is especially of concern to older women.

Markings

The areas are marked on the standing patient. Areas of adhesion to the deep fascia are especially marked for their identification during surgery and their release. The area to be suctioned is also marked in all of its surface as well as feathering going toward the central area and inferiorly. Palpation is used with the pinch test to determine the area of most excesses and the areas to be spared. If the scapular area is too thick, some defatting will be necessary especially at its lower border.

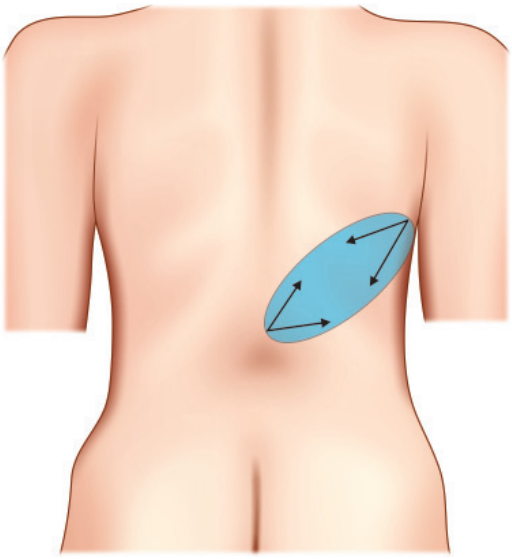
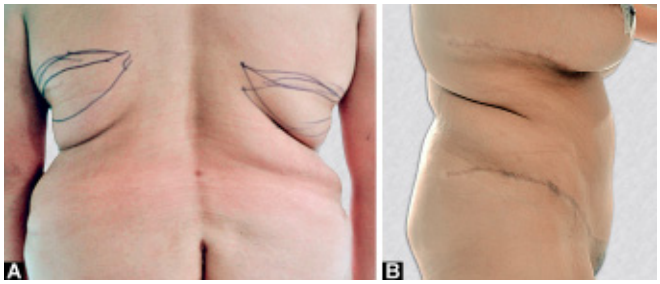


FIGURE 17-1
The back and subscapular liposuction encompasses the mid back area between the scapulae and the waist



FIGURES 17-2A AND B
Typical thoracic rolls occupying the area on an older patient

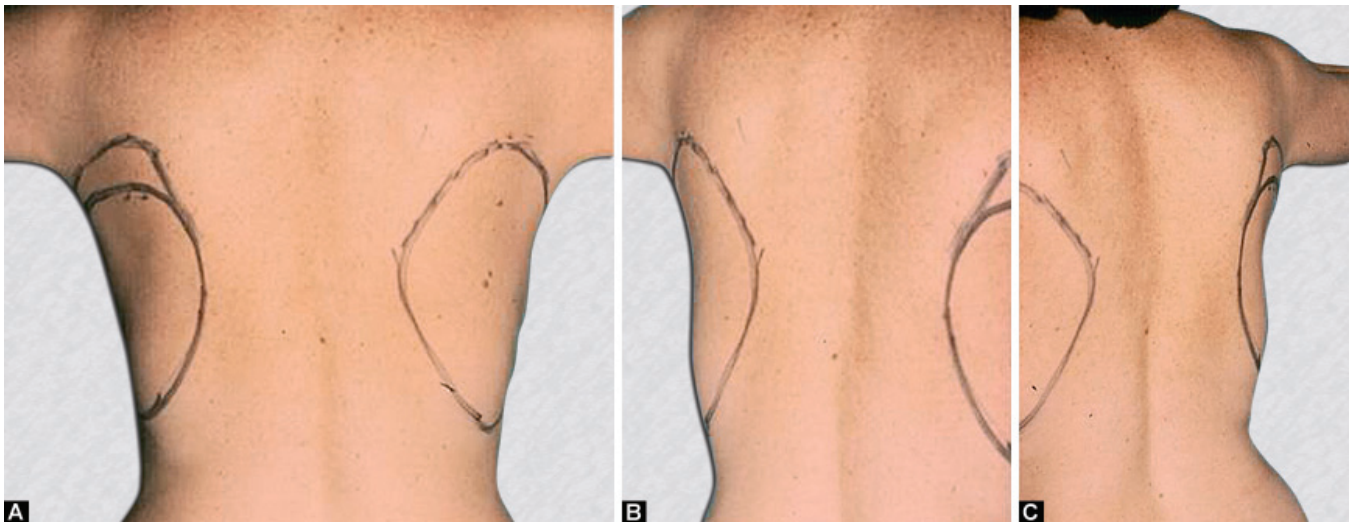
The markings then will mark in the area below the scapula and this amounts to a large elliptical area occupying the whole posterior area of the thorax **(Figures 17-1 to 17-3)**.

Incisions

Crisscrossing is very important and two incisions will be useful to accomplish this goal. A posterior border of the axillary crease will help to liposuction downwards in the back. A second incision either inferiorly near the thoracic spine or in the midline can be used for proper crisscrossing **(Figures 17-4 and 17-5)**.

Instruments and Techniques

Instruments are the usual 4 mm and 3 mm cannulas and especially a Robles cannula will be useful to free all the deeper attachments of the deep fascia to the muscular septa. This release is necessary to allow the skin to redrape properly. Crisscrossing is performed from two zones. The skin is grasped as a sausage and the cannula is introduced between the fingers to extract the remaining fat. Continuous testing and palpation is done as well as close observation. A counter-incision should be made in some areas for proper crisscrossing even if it is found to be relatively difficult. The patient's positioning has to be in an exact prone position with even some flexion of the back to prevent the untoward direction of the cannula to go between the ribs or below the ribs and through the diaphragm. This should be done with care to prevent these potential complications.



FIGURES 17-3A TO C
A 44-year-old woman with back liposuction. Markings are made according to her wishes as to the removal of the unwanted bulges. By a combination of inspection and palpation with the pinch test, the extent of the suction is indicated with ink

FIGURE 17-4

Back liposuction through an inferior approach using a 4 mm cannula. Note the opposite hand position and function during the suction

FIGURE 17-5

An alternative incision used after a large nevus of the back has been excised

Caveats

In view of this fact, patients should be warned in advance that there is a possibility of overhanging of skin when the complete release is unsuccessful. The patients should be warned about possible dents, waves and bumpiness, however, the main problem is the remaining waves present even after suction.

Refinements

Refinements with finer cannulas are done at the periphery of the zone and either without suction or with light suction. Closure is done as usual with absorbable sutures and garments are applied for a few weeks. Postoperatively the patient is discharged with garments, pain medication and antibiotics, and they are allowed to start massages and exercises the week postoperatively.

Complications

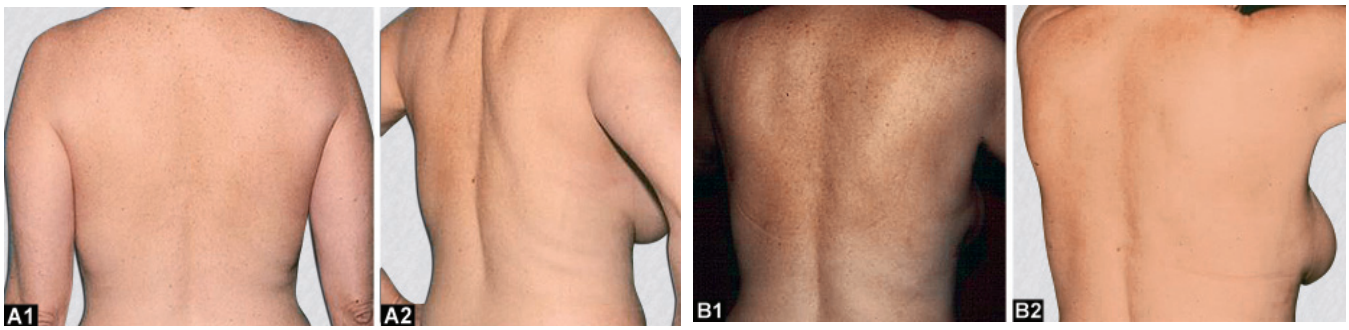
The usual surgical complications as well as the complications related to blood loss can be seen. The main type of complication is of a cosmetic nature, as mentioned above.

Discussion

The advent of liposuction has afforded patients a new treatment for back deformities which were impossible to correct in the past. The treatment provides good results and relatively low rates of problems **(Figures 17-6A and B)**.

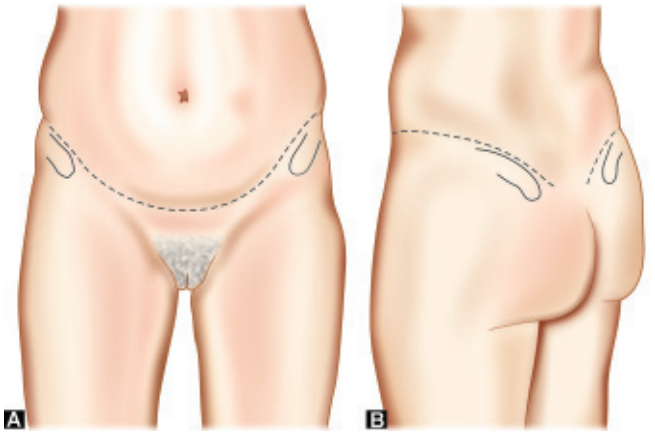
Flankplasty

After Regnault and Daniels,[1] original description of a combination of abdominoplasty and flankplasty, Baroudi[2]

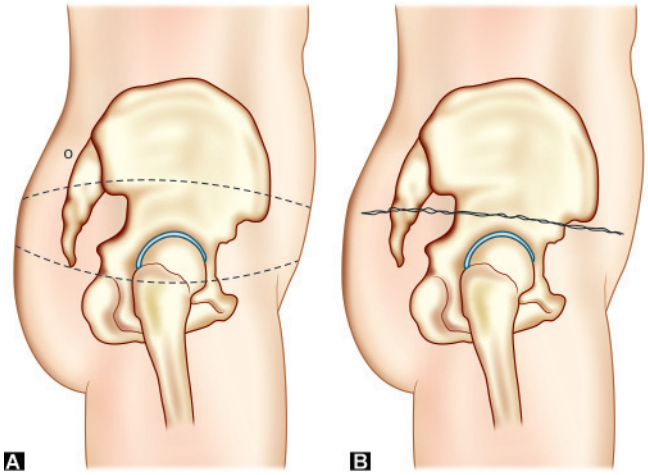


FIGURES 17-6A AND B

(A) Preoperative patient showing bilateral appearance of the fatty excesses which are noted just above the waist. Note the unsightly bulge situated below the scapula and above the waist; (B) Postoperative after back liposuction



FIGURES 17-7A AND B
Flankplasty by Baroudi



FIGURES 17-8A AND B
Hip lift excision markings for the transverse flank, thigh, and buttock lift. Upper and lower markings of excision with the desired closure lines within a bathing suit area

developed the procedure and presented his results. It has been modified later by Lockwood[3] **(Figures 17-7 and 17-8)**.

If there is a large amount of skin excess in the flank associated with abdominal fatty excess and flabbiness, the operation consists of continuing the lateral extension of the abdominoplasty in an almost circumferential manner and to excise a large ellipse of skin bilaterally after having suctioned the areas above and below the lines of excision of the ellipse. The scars are situated over the iliac crests. Surgery is started on the patients in the prone position excising the posterior lateral portion of the ellipse and then after the patient is turned in the supine position, completion of the excision is performed either excising only flank skin or continuing into the abdomen excising an excess of skin between the pubis and the umbilicus.

Hip Lift

The thigh buttock lift devised by Pitanguy[4] in 1964 addressed only the thigh redundancy problems. It lifted the thigh well and, completed by liposuction, it improved the saddlebags and posterior thigh area. However, this operation does not improve the trunk redundancy. The noticeable scars, recurrence of deformity, unnatural contours and wound problems are all untoward effects.

In cases of thigh and trunk skin laxity, the treatment by an anterior approach such as an abdominal lipectomy and a posterior approach by hip trochanteric lipectomy brings some improvement in the areas, however, it does not fully tighten the lateral trunk.

Liposuction performed in the back, flank and saddlebag areas will reduce the fat excesses but it does not address the skin problem. An operation to tighten the back and flank area as well as the thighs has been shown by Lockwood[3] and allows improvement of these areas **(Figures 17-9A to C)**.

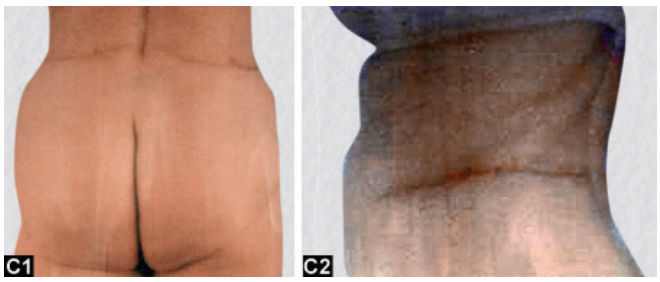
Indications

Two types of deformities are treated with the procedure. The skin of the sides below the ribs is often redundant due to two factors: (1) the natural laxity of the skin developing with aging, (2) this skin is blocked in areas of fixed points where the excess skin is stopped at the level of the waist by these fixed points. In cases of thigh relaxation and old-age cellulite, many skin irregularities are due to an excess of skin and the folding limited by the fixed points situated in the hip area at the level of the knee. The second deformity improved by this procedure consists of the thigh and saddlebag skin redundancy.

These two areas of skin laxity can be treated with one excision removing upper and lower excesses after freeing the skin from its deeper attachment. This technique has been useful in cases of mild rolls with adhesions.

Technique

A circumferential line is marked starting posteriorly at the level of the sacroiliac junction and hugging an area just below the iliac border and then going anteriorly toward the iliac crest. The line of excision resulting from the transverse resection of trunk and thigh skin is closed in layers approximating the superficial fascia below before closing the skin above. This combination of flank liposuction, buttocks and saddlebags suction with excision is an excellent contour for patients willing to accept the transverse flank scar.



FIGURES 17-9A TO C

(A) Preoperative 59-year-old woman with flank redundancy and thoracic rolls especially more severe on the right, secondary to scoliosis; (B) Markings in place for a hip lift procedure useful for thoracic rolls and buttocks and thigh lifting. They could conceivably encompass more skin excision, however, with an older patient it is safer to leave some slack to the skin for fear of vascular difficulties; (C) Postoperative

Excision of the Ellipse

A line is designed limited above by the back, flank and abdomen and below by the buttocks and thighs. The excision lines are marked above and below this line designed to stay within the bathing suit area. These lines are determined by the extent of excision necessary and visible depending on the existing deformity presented by each patient.

A transverse resection of the inferior redundant buttock and thigh skin is performed after proper liposuctioning of the area. Skin undermining is performed down to the saddlebags area releasing the hip attachments of the superficial fascia system that are the sites of the lateral gluteal depression.

The transverse resection of the superior back, flank and abdomen is performed ending the elliptical skin excision superiorly. The skin is undermined to free the two flank fixed points responsible for flank waviness.

The correction of the flank waviness is due to two factors. The liposuction of the area is performed, however, in view of the undermining to be done at the excision stage, no attempt is made to free the fixed points responsible for waviness by suction alone. Once the skin has been excised superiorly, undermining is performed over the ribs up to the lower level of the scapula, thus freeing the "fixed points" and tightening the flank skin. Repair is done in layers including the superficial fascial system (SFS) and the dermis. This operation presents the advantage of correcting the flank laxity as well as the thigh laxity and it can be safely combined with liposuction since it does not cut across vascular territories. It can even be combined with an abdominal lipectomy providing again that the vascular territories are not violated.

The Dowager's Hump

The Dowager's hump is a very unsightly deformity secondary to fatty accumulation in the subnuchal area and upper back **(Figure 17-10)**.

FIGURE 17-10

Dowager's hump

Anatomy

It is situated below the seventh cervical vertebra and occupies the upper part of the back down to the eighth thoracic vertebra. The hump can be quite large. It is centrally located and rarely reaches the outer limits of the scapula.

No specific treatment existed in the past. With liposuction, an almost complete cure of the deformity without major sequelae or untoward effects and minimal scarring can be accomplished.

Indications

Any Dowager's hump can be treated since the fat is well contained and there is no major organ or neurovascular element involved in the area. Any age is adequate and the usual indications for any type of surgery applies. As far as the specific indications for this procedure, there are no contraindications since the skin should drape properly.

Caveats

Again, as mentioned, no specific problem can be encountered except for the surgeon's own resistance to extract the fat completely from the area leading in these cases to incomplete removal and possibly irregularities, depressions, and bumps.

Technique

The operation is best performed in the lateral decubitus position. If the patient is lying on her side, it is preferable to position her with the right side up if the surgeon is right-handed, or the opposite if the surgeon is left-handed.

In cases when the surgery is to be performed under local anesthesia, the seated position can be used, the head resting on both arms of the patient, thus allowing downward suction with the cannula below which makes it easier for the surgeon.

Instruments

4 mm and 3 mm cannulas usually suffice for this type of procedure.

Postoperative Care

The patient is bandaged as usual using Elastoplast or compressive garments after the wound has been closed with one absorbable suture, and exercise and activities are allowed approximately 10 days after surgery.

In conclusion, this is an easy procedure for liposuction if the localization of the Dowager's hump is accessible on the patient.

References

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2. Baroudi R. Flankplasty: a specific treatment to improve body contouring. Ann Plast Surg. 1991;27(5):404-20.
3. Lockwood T. Body contouring of the trunk/thigh aesthetic unit. Plast Surg Nurs. 2003;23(3):110-3.
4. Pitanguy I. Trochanteric lipodystrophy. Plast Reconstr Surg. 1964;34:280-6.

18 Arm Liposuction

Adrien E Aiache

ABSTRACT

In younger patients with taut skin, the results of arm suction are usually gratifyingly smooth and homogenous. Older patients, on the other hand, often end up with hanging skin, irregularities and bumpy areas. Fatty deformities of the arms often seen in association with regular obesity are the primary indication. Patients with large fat deposits and hanging skin will only respond to an arm lipectomy with a large excision. All patients, especially the older ones, should be warned that irregularities and incomplete removal can be observed after suction. Preoperative markings are of extreme importance. Circumscribe the desired area with the patient standing with the arms in the victory position. Complications in the arm usually consist of hanging skin, irregularities, bumpy arms and insufficient removal. Fat excess with insufficient removal and irregularities are the most common problem.

General Principles

In younger patients with taut skin, the results of arm suction are usually gratifyingly smooth and homogenous. Older patients, on the other hand, often end up with hanging skin, irregularities and bumpy areas. The surgeon should, therefore, be aware of older patients.

Fatty deformities of the arms are, however, most common in older patients. The deformity is either one of circumferential obesity from the elbow up to the shoulder, or in most cases, an excess of fat localized in the posterior tricipital area of the arms with a more normal less fatty skin present anteriorly in the bicipital area.

In addition to the excess of fat, skin laxity will lead to ptosis of the posterior arm especially in older patients and in any patient after massive weight loss. As is the case in other parts of the body, excess skin will not fully contract after liposuction resulting in an accentuated deformity with ptotic, hanging, thinned-out skin. The cosmetic result in these cases can be greatly improved if, in addition, skin excision is performed and it will be shown in the next chapter.

Indications

Fatty deformities of the arms often seen in association with regular obesity are the primary indication. The same deformity may be also seen in older patients with moderate obesity because some patients will develop a particularly large deposit in the arms. The ideal case is, however, a younger patient with taut skin and moderate arm deposits occupying probably only one-third to one-half of the arm gvolume and geographic distribution.

Contraindications

Patients with large fat deposits and hanging skin will only respond to an arm lipectomy with a large excision.

Anatomy

The area involved with excess fat is usually the posterior tricipital area and the deltoid area. A moderate layer of deep fat is present in the posterior deltoid layer situated above the fascia superficially. This anatomical situation dictates prudent suction to avoid irregularities and depressions **(Figures 18-1 to 18-9)**.

Caveats

All patients, especially the older ones, should be warned that irregularities and incomplete removal can be observed after suction. The arm is a long tubular area of skin with the weight of the fat pulling down and hanging with the accompanying skin. Sensory disturbances can also be noticed in some cases.

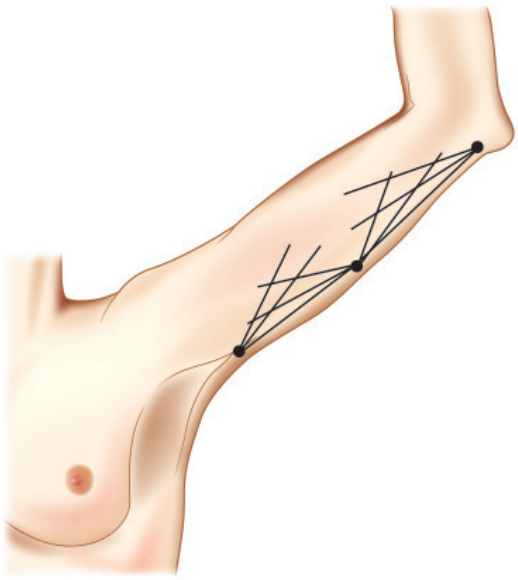


FIGURE 18-2
Arm liposuction can be performed utilizing various incisions; three favorite incisions are at the elbow, the axilla, and the mid arm region respectively

FIGURE 18-1
Markings for arm liposuction. Notice the extension of the markings over the posterior shoulder area

FIGURE 18-3
Markings: Standing, arms down; standing, arms at 90°; use of the pinch for evaluation of the thickest area and the remaining portion to leave untouched. The zone of feathering is marked as a second line

FIGURE 18-4
Further extension of the markings over the shoulder in cases with thick shoulder area. There is a deep layer of fat situated below the fascia superficialis in that region

FIGURE 18-6
The posterior tricipital fat is in a junctional area at the upper arm level and is often suctioned insufficiently. The picture shows the revision necessary in the patient to ensure proper defatting of the upper arm. This is usually done through an axillary incision. Localized liposuction of an area is performed under local anesthesia. This should be estimated carefully in view of the fact that this area is often neglected and will then remain excessive

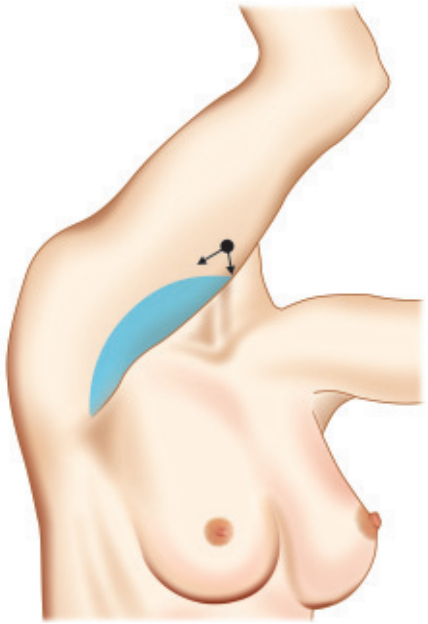


FIGURE 18-5
Another advantage of the mid arms incision is that the crisscrossing is helpful in correcting large arm deformities thereby achieving a more homogenous result

FIGURE 18-7
Upper extension of the markings to thin out the broadest part of the arm

FIGURE 18-8
The elbow approach is technically easier to perform than the axillary approach as it allows for a more extensive suction

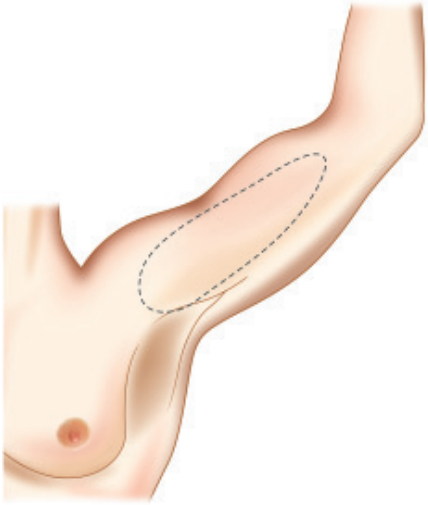


FIGURE 18-9
Unfavorable thin skin anteriorly does not retract fully and it is flaccid and has very poor retractability and redundancy leaving a very irregular zone

Positioning

The patient is placed supine and the cannula is then introduced through the axilla or below and behind the elbow. The prone position is often used when other procedures such as thighs and saddlebags are done concomitantly, however, the supine position is the most comfortable for the operator **(Figures 18-10 to 18-15)**.

Anesthesia

Although general anesthesia can be done satisfactorily, local can be used. The tourniquet is not useful because it is over the suction zone. Circumferential large extensive suction is usually treated with general anesthesia.

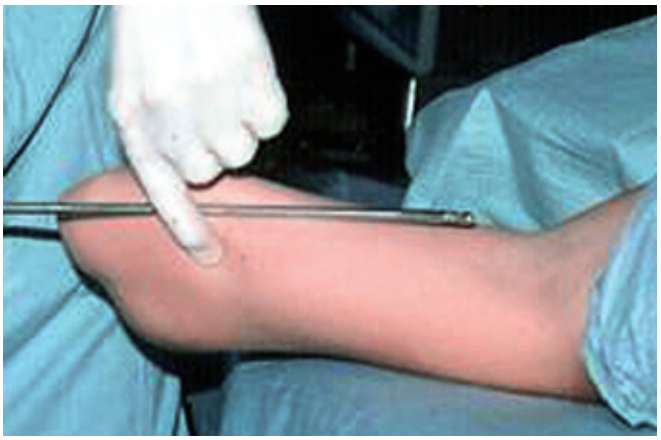


FIGURE 18-10
Supine position elbow approach. This is an easy technique for posterior arm liposuction and concentration of defatting at the most proximal posterior part of the arm which is often not completely well suctioned

FIGURE 18-11
Prone position back approach defatting. In cases where the prone position is used for other areas, this approach is useful for the posterior arms. Additional suction is done in other areas in that position

Markings

Preoperative markings are of extreme importance. Circumscribe the desired area with the patient standing with the arms in the victory position. This will show the excess situated in the inferior part of the arm and posteriorly. Anteriorly, the skin is extremely thin and suction in that area is an invitation to a catastrophe. Palpation and pinch of the skin fold is used for determination of the thickness to be reduced. These markings are often delicate and difficult to locate

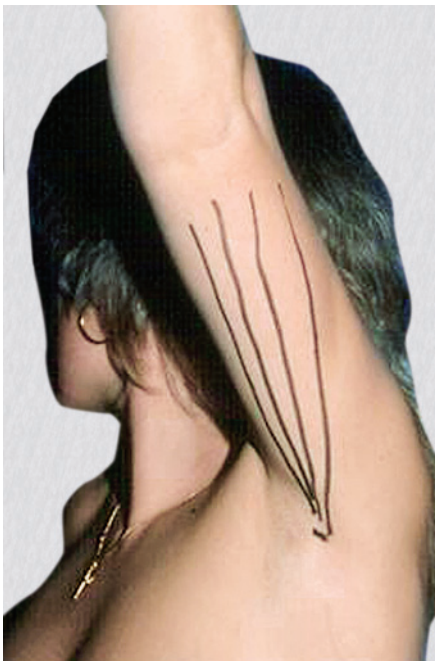
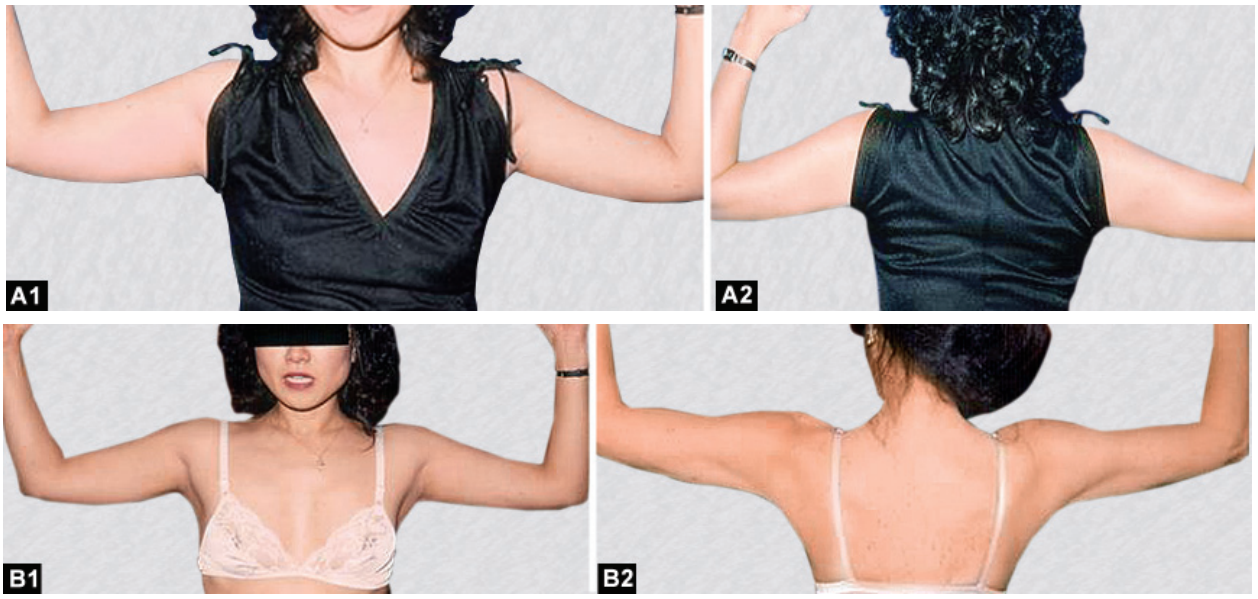


FIGURE 18-12
The axillary approach allows a thorough uniform liposuction of the proximal arm region

FIGURE 18-13
The axillary approach will necessitate proper positioning of the patient in order to be effective. It is sometimes difficult to reach properly and an incision is made in the posterior axillary fold to be able to reach the posterior arm

FIGURE 18-14
The posterior axillary approach allows the proximal arm defatting by direct approach in the prone position

FIGURE 18-15
Postoperative dressings with Elastoplast are now abandoned in favor of a circular compressing garment



FIGURES 18-16A AND B

(A) Preoperative 36-year-old woman with moderate arm lipodystrophy and ptosis; (B) Postoperative less than 125 grams of fat was liposuctioned out of each arm. Note the thinning out without incidence of ptosis

satisfactorily and one has to decide the area of demarcation with the untouched skin. The first marking encompasses the area to be defatted and the second circular marking indicates the feathering. The best areas to improve are the deltoid area and the triceps area.

Further local markings are made as the surgeon evaluates the arm. This is done with the arm down, up at 90°, and then up. Visualization as well as palpation is used to pinpoint the amount of suction to be used. Circumferential visualization of the arm is especially important. The area immediately above the elbow must be checked for depressions and excesses since this zone is sometimes extremely developed. The anterior demarcation must be precisely determined to avoid difficulties. The outer portion represents a judgment problem of where to stop the suction. One has to imagine the area in a tangential view in order to be able to correct it. The unfavorable area is the anterior part over the medial biceps and medial to it over the neurovascular bundles where the skin is extremely thin over a moderately thinner fat deposit. Do not forget the "groove" between the deltoid and the biceps in the anterolateral view. The groove can either be minimized by avoiding it during suction or accentuated. Also, do not miss the uppermost posterior area near the deltoid **(Figures 18-16A and B)**.

In evaluating all these areas, the pinch test is used constantly and routinely. It is the single most physical evaluating tool besides vision.

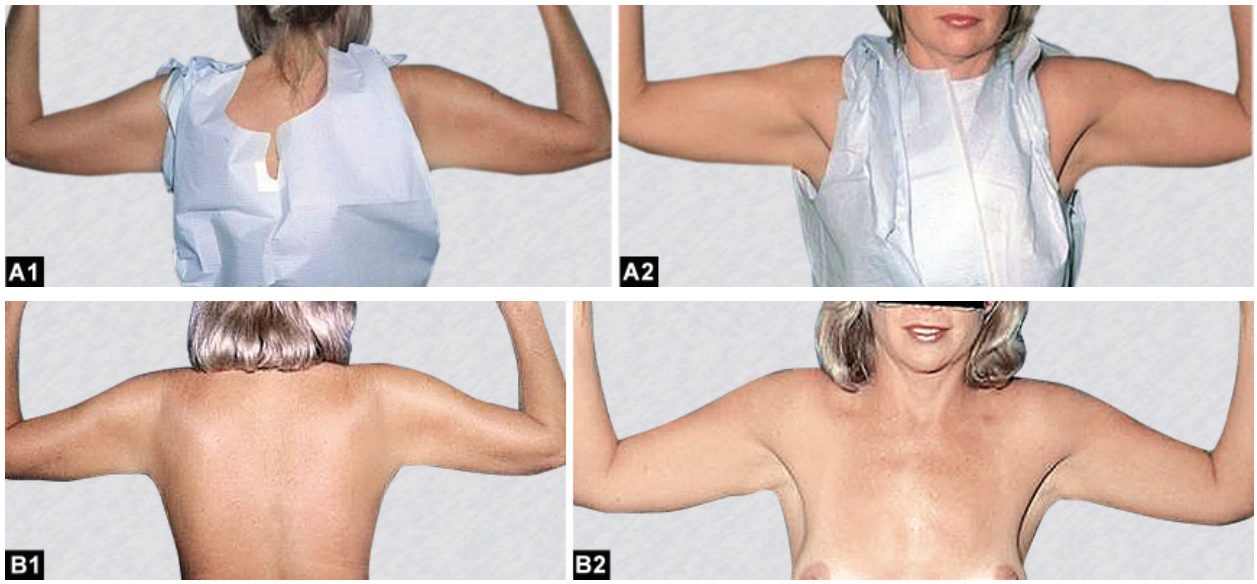
It is useful preoperatively to mark the thickness of skin to evaluate the improvement later on during the case.

Instruments

In obese patients, 4 mm cannulas are used initially followed by a 3 mm cannula for refinements. In thinner patients, a 3 mm cannula is used throughout. Feathering of the edge is performed at the end of the procedure with the same cannula.

Incisions and Surgical Technique

Short incisions are made in the axilla or in the posterior condylar aspect of the elbow. The liposuction is done as usual with a sawing motion using 10–15 back-and-forth motions of the cannula until a satisfactory pinch test and inspection is obtained. A secondary incision can also be placed at the mid arms in more difficult cases. This will remain relatively unnoticeable if before the incision the infiltration with anesthesia is done, even under general anesthesia using the tumescent solution. If one prefers it, the ultrasound can be used in that zone as well as any other type of suction mechanism. Extreme care is taken in the procedure to achieve a homogenous skin thickness

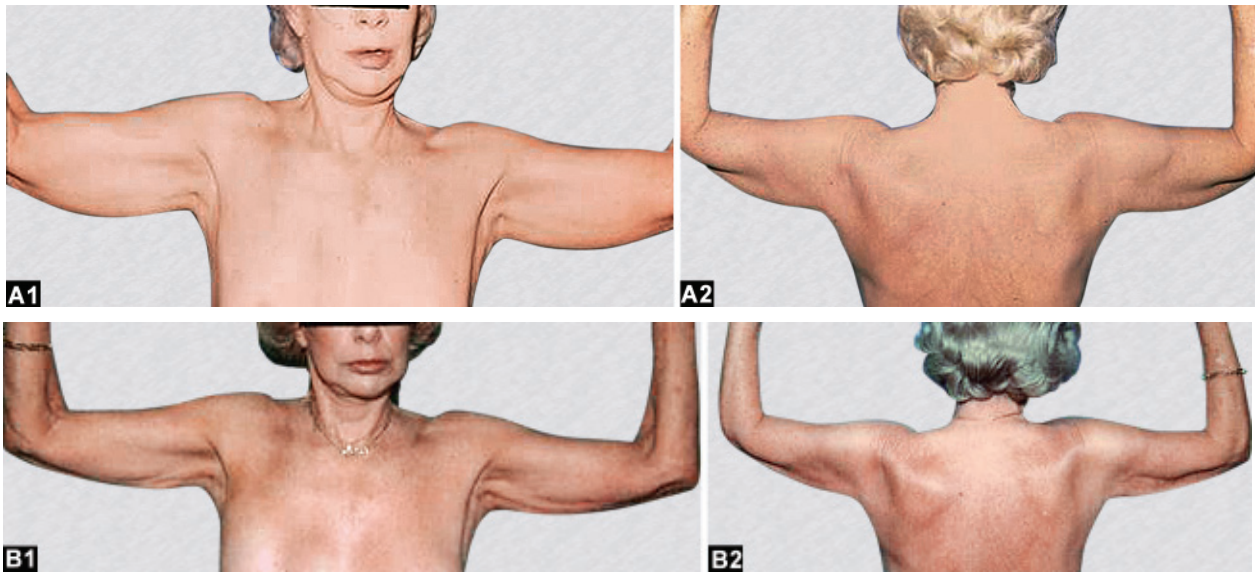


FIGURES 18-17A AND B

(A) Preoperative 42-year-old woman with arm lipodystrophy and ptosis. Notice the large amount of tissue in the upper arm. This indicates a poor result for that limited area. The measurement shows that the redundant part occupies more than 50% of the posterior surface of the arm and this is a poor indication for a good result as shown by Illouz; (B) Postoperative

from the elbow up to the upper part of the arm. Although the procedure is relatively bloodless, it is a difficult task especially for the novice surgeon. Beware of the moderately obese with very flabby skin **(Figures 18-17A and B)**.

In more severe deposits, almost circumferential suction will be necessary, however, in extreme cases combined with excision of skin, the excision will follow the liposuction procedure allowing an easier access to the remaining deposits. Dangerous structures to keep in mind during the procedure are the axillary vessel and nerves, the ulnar nerve at the elbow, the olecranon bursa, and the radial nerve at the outer lower portion of the arm posteriorly **(Figures 18-18 to 18-21)**.

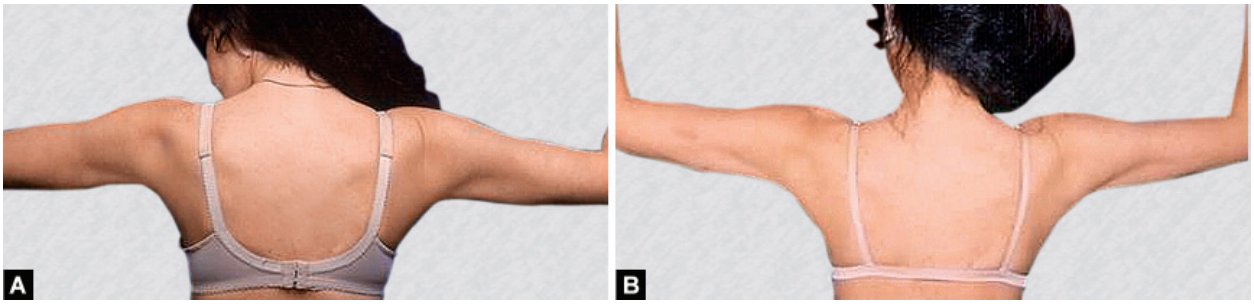


FIGURES 18-18A AND B

(A) Preoperative 59-year-old woman with arm lipodystrophy and marked redundancy and flabbiness; (B) Six months postoperative showing the skin excess with skin flabbiness that failed to shrink properly

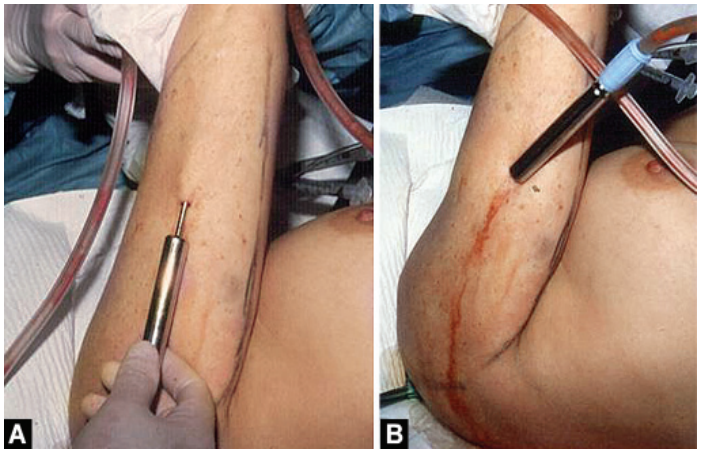
FIGURES 18-19A AND B

(A) Preoperative 52-year-old woman with bilateral arm lipodystrophy and obesity. Note the excess skin and flabbiness; (B) Six months postoperative appearance on the same patient. In obese arms, although there are no irregularities in a well done job, the skin nevertheless will hang and look empty from the back when the patients extend the arm. In these patients, liposuction will often result in an "empty bag" phenomenon resulting from a lack of shrinkage which may last for a long time. Eventually these patients will undergo a complete excision brachioplasty 2 years later



FIGURES 18-20A AND B

(A) Preoperative 35-year-old female with moderate arm lipodystrophy; (B) Ten years postoperative



FIGURES 18-21A AND B

(A) A mid arm incision is performed in cases of liposuction where finessing is necessary and difficulties are encountered in suctioning from the elbow or axilla; (B) The same cannula is used for finessing and feathering

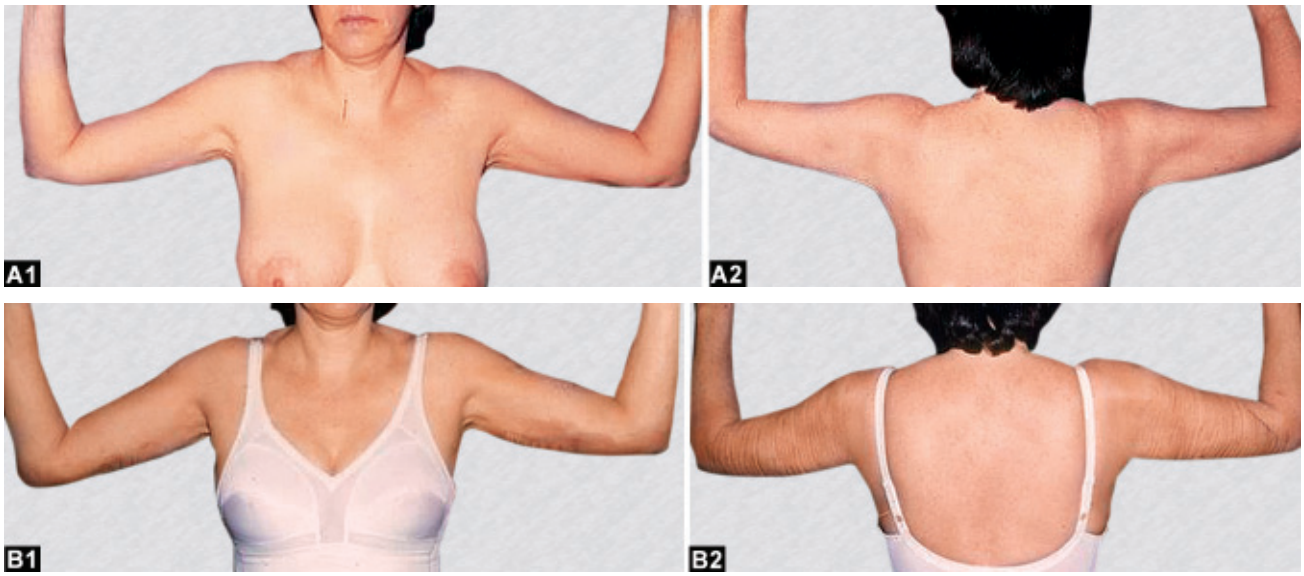
Complications (Figures 19-22A and B)

Complications in the arm usually consist of hanging skin, irregularities, bumpy arms and insufficient removal. Rarely does one see sensory disturbances. Fat excess with insufficient removal and irregularities are the most common problem. No complications such as infection or hematoma have been seen by the author.

Other possible complications include:

- Irregular surface
- Complications according to locations of the liposuction
  - Posterior: Less common
  - Medial: Very common, thin, unshrinkable skin
  - Anterior: Similar to medial, thin, crumpling skin.

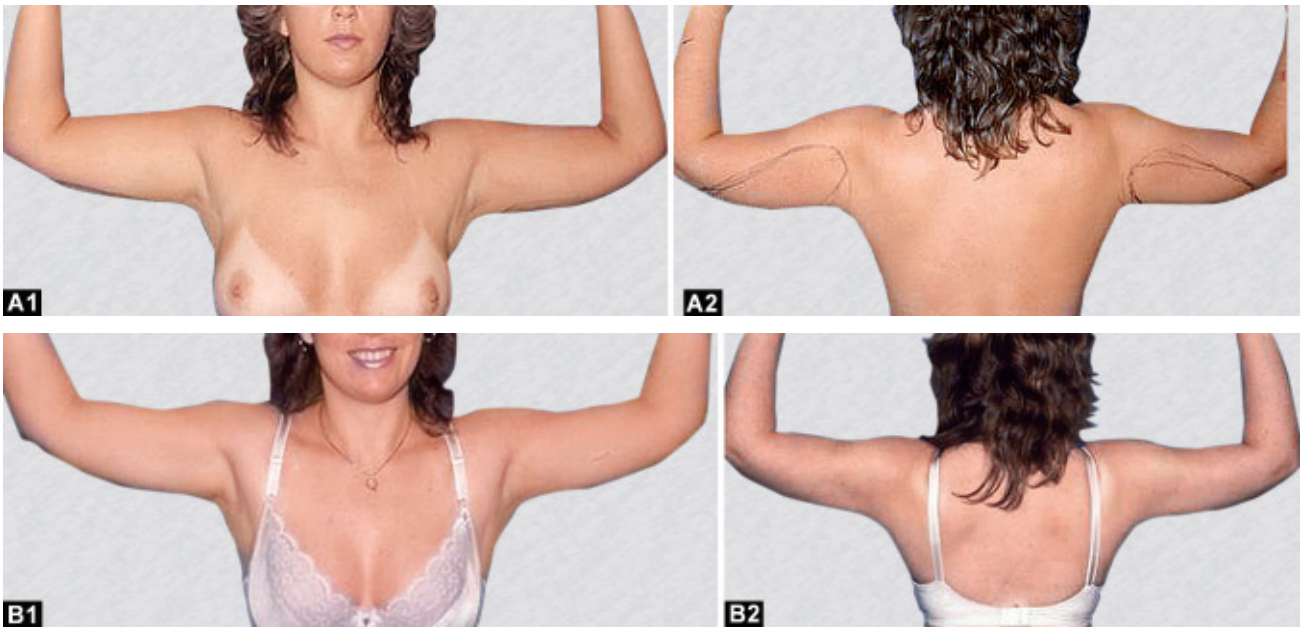
A common complication is in the posterior arm that will have bagginess if the excess fat deposits and skin is considerable. Usually it should be less than 33–50% of the surface of the arm, otherwise the skin will completely



FIGURES 18-22A AND B

(A) Preoperative 44-year-old woman with arm lipodystrophy; (B) Early postoperatively showing the residual bruising and swelling

collapse and not shrink. To avoid this problem, careful defatting should be done, crisscrossing, and one should watch for dents and use only a skin cannula **(Figures 18-23A and B)**. An excessive amount of liposuction will end up with worse results than a conservative amount in people who are relatively unsuitable for this surgery.



FIGURES 18-23A AND B

(A) Preoperative 26-year-old woman with mild obesity and bilateral arm lipodystrophy; (B) Six months postoperative

19 Combined Brachioplasty and Liposuction of the Arms

Adrien E Aiache

ABSTRACT

Treatment of the deformity of arm lipodystrophy has consisted of large excisions of posterior skin with the resulting scar placed in a non-conspicuous area such as the medial part of the arm which is hidden when the arm is against the chest. In spite of the effort to minimize the visibility of the scar, few people accept such extensive problems. The treatment in cases of extreme obesity is liposuction. Ideal patients for the combination of techniques are patients who have skin flabbiness, poor skin tone, and who are older. In these cases, it is uncommon to see any spontaneous shrinking of the skin and the only treatment available is the brachioplasty, however, even brachioplasty can be helped by liposuction in the areas that have not been excised, thus allowing a thinner arm and better scar with less stretching.

Introduction

Arm lipodystrophies may result from any of several factors. In adolescents, arm lipodystrophy can be indicative of an ethnic characteristic as well as a family trait and can appear as an isolated deposit of fat especially situated in the posterior aspect of the arm. However, with advancing age, arm lipodystrophies are most often seen in patients with mild to severe obesity. In these cases, the fat localizes in many areas including the arms.

Treatment of this deformity consists of large excisions of posterior skin with the resulting scar placed in a non-conspicuous area such as the medial part of the arm which is hidden when the arm is against the chest. However, in spite of the effort to minimize the visibility of the scar, few people accept such extensive problems. The treatment, which is considered efficacious in cases of extreme obesity, can now be offered in addition to plain liposuction **(Figures 19-1 to 19-3)**.

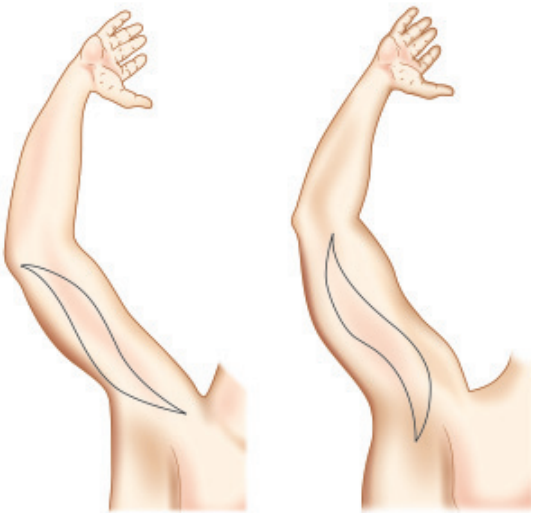


FIGURE 19-1

Longitudinal brachioplasty: Two different types of ellipse excision can be used for brachioplasty. The liposuction is only performed at the outer aspect of the ellipse that is then excised in its total thickness

FIGURE 19-2

Through axillary, elbow and mid arm incisions at the periphery of the ellipse to be excised, the liposuction process is undertaken to reduce the arm circumference and thus facilitate the closure of excision

FIGURE 19-3

Appearance of the skin ellipse on a preoperative case

Indications

Ideal patients for the combination of techniques are patients who have skin flabbiness, poor skin tone, and who are older. In these cases, it is uncommon to see any spontaneous shrinking of the skin and the only treatment available is the brachioplasty, however, even the brachioplasty can be helped by liposuction in the areas which have not been excised, thus allowing a thinner arm and better scar with less stretching.

Patients who have very little excess fat and a large amount of flabbiness and looseness will mainly benefit from excision, however, patients who have a very large amount of fat without excess skin might not be as excellent candidates for this surgery.

Caveats

The patient should be warned about the usual difficulties associated with liposuction such as irregularities, waving, and over-removal or under-removal in addition to the problem associated with a brachioplasty consisting of scar irregularities and unevenness, depressions, hypertrophy in addition to possible hematomas, seromas, infections and lymphatic blockage which is sometimes the result of the combination of these two modalities.

Markings and Preoperative Preparation

Markings are made on the erect patient and the patient with the arm extended in the victory position. The incisions are marked in the posterior epitrochlear area and in the axilla, when fatty deposits are present and a possibility of unevenness exists, the multiple approaches can be used for an even result. The markings preferred by the author are the very long S-shaped excision oriented one way or the other which allow a scar with less tension since the straight scars can create more difficulties than this type of oblique, lazy-S fashion scars.

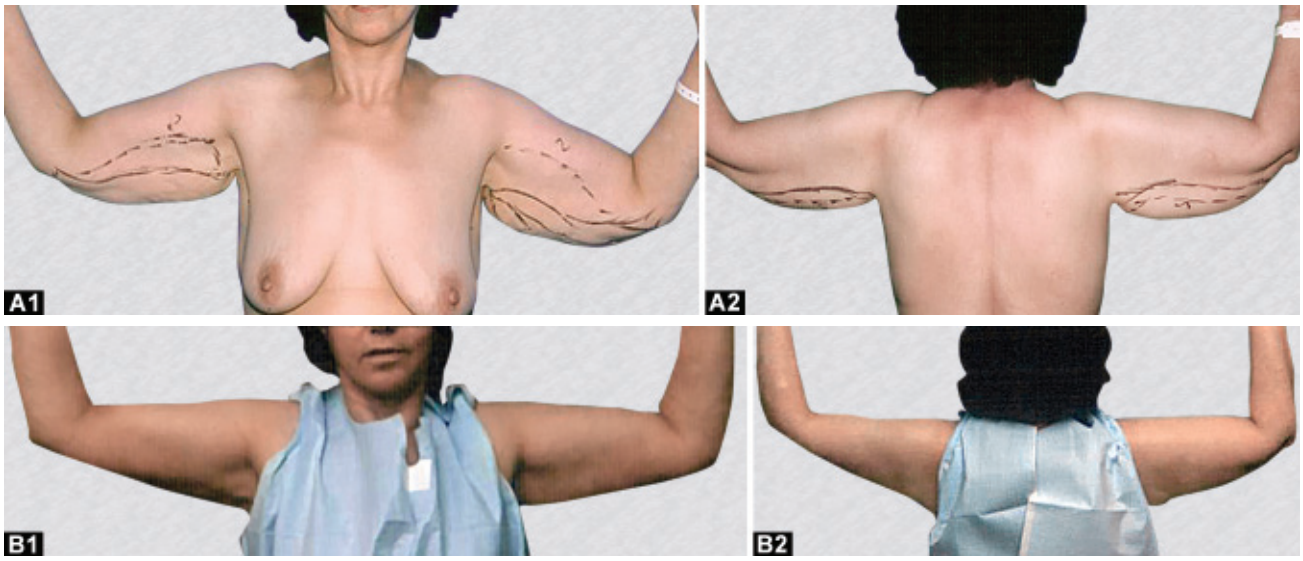
Excision Markings

After the markings for suction, the markings for excision are made in an attempt to see the exact amount of skin to excise. The area to be excised can be changed at the time of surgery and the surgeon should start with only a one-sided incision, do the undermining and then attempt at possible closure which will determine the exact location of the opposite excision of skin, thus assuring against any problems of over-excision ending up in too much tightness in the scar and in the circumferential area.

Technique

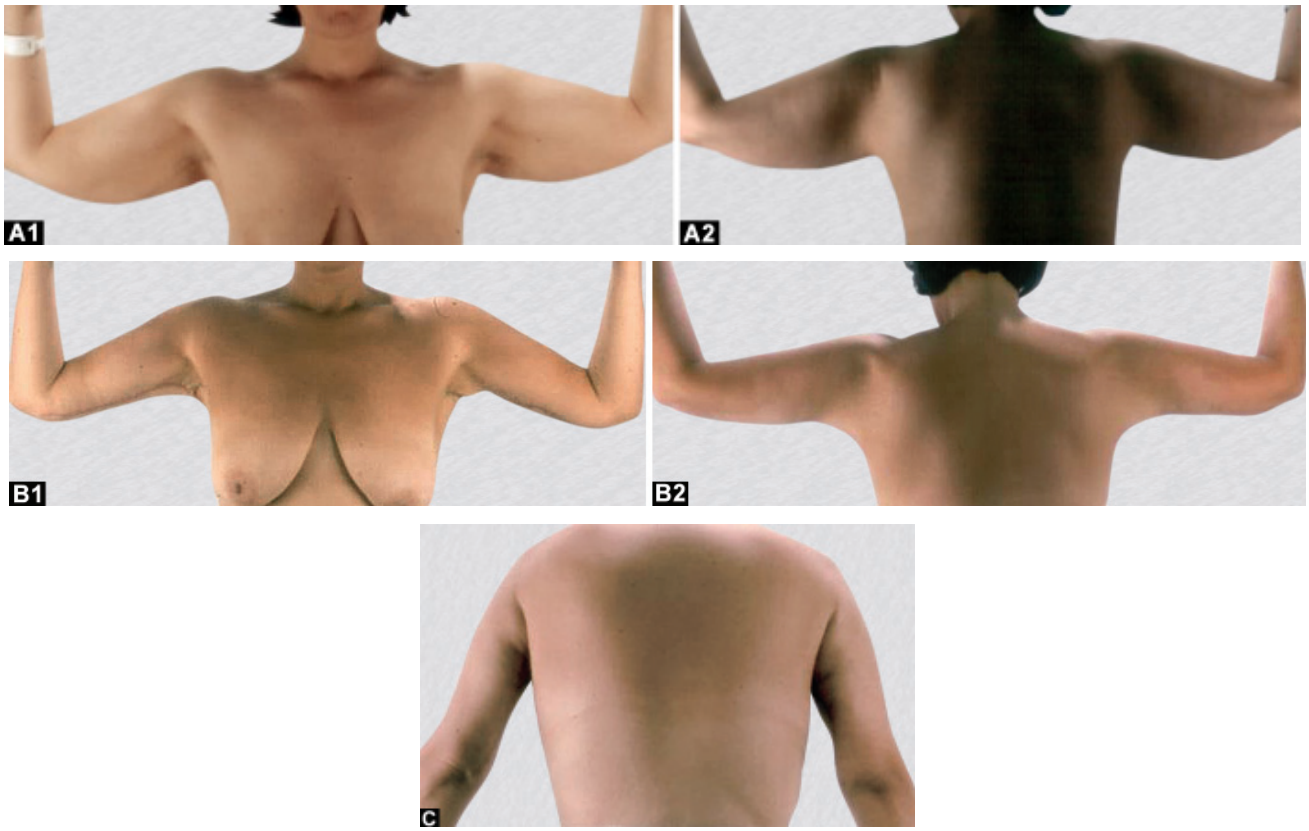
Longitudinal Brachioplasty and Liposuction

A sinuous ellipse is drawn ending up as a sinuous scar from the axilla to the elbow. At the level of the axilla, it ends up with a turned-up scar as a hockey stick allowing a transverse excision to improve the zone. The elbow should be avoided, drawing the scar to end short of it medially and to stay inconspicuous. If the scar is too posteriorly placed, it becomes visible from the back. The upper part of the scar should end up in the axilla with enough tapering completed by liposuction to avoid any dog ears. A very limited amount of undermining should



FIGURES 19-4A AND B

(A) Preoperative 52-year-old woman with bilateral arm lipodystrophy and skin redundancy. Note the markings for excision, liposuction, and feathering in between the two areas to prevent sharp demarcation; (B) Six months postoperative. Notice again the excision and the zone of feathering which could also be a complete zone of excision if it is judged to be necessary for proper closure without tension



FIGURES 19-5A TO C

(A) A 45-year-old woman with arm lipodystrophy and skin excess and flabbiness secondary to large weight loss; (B) Six months postoperative condition after liposuction and longitudinal brachioplasty; (C) The scars can be inconspicuous because they are well-hidden in the medial part of the arm

FIGURE 19-6

Transverse brachioplasty. A small crescent excision in the axilla will be sufficient to correct the slightly redundant skin in older patients afflicted with loose skin. The liposuction can be done from the axilla

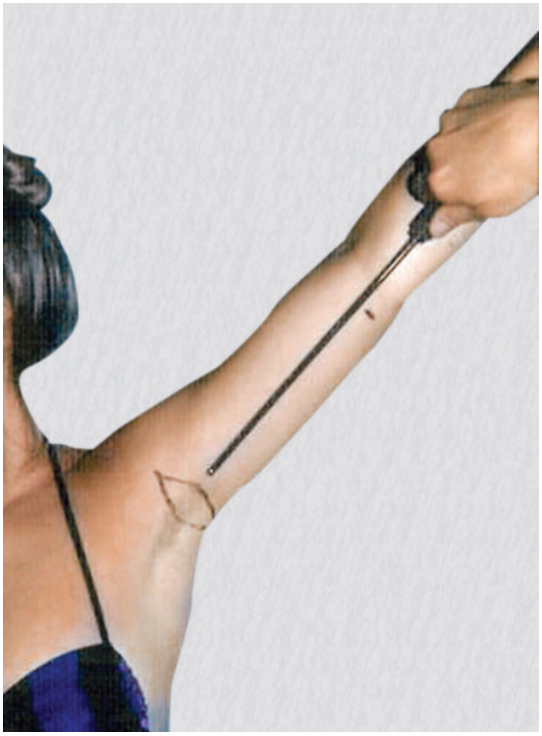


FIGURE 19-7

An elbow incision can be useful to achieve regular homogenous liposuction associated with the ellipse excision

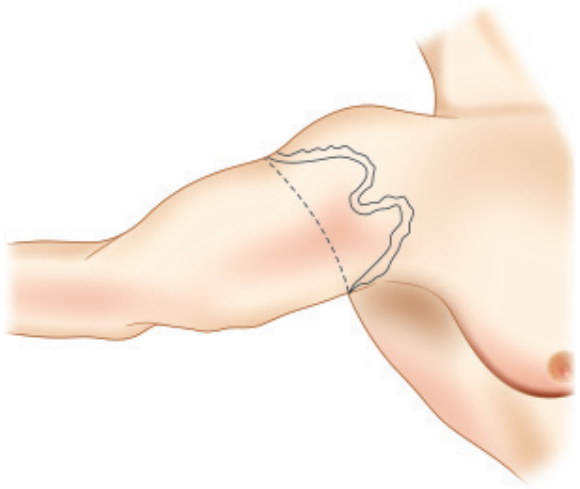


FIGURE 19-8

Larger excision of skin in the axilla. In these cases, the incision passes the limits of the pectoralis and the latissimus posteriorly since the skin is in excess. This can be excised and removed as marked by the dotted line

be performed for fear of vascular problems. During surgery, the arms should be flexed and extended in order to prevent esthetic difficulties **(Figures 19-4 to 19-8)**.

Anesthesia

Depending on the size of the problem to be treated, general or local anesthesia can be used. General anesthesia is usually the most common in cases of extreme excess of fat and extreme skin redundancy. An additional diluted solution of epinephrine is used as a tumescent fluid for reduction of blood loss.

Local anesthesia can be performed. It is done usually on patients who are very cooperative and do not need an extremely large amount of liposuction but mainly skin excision. The local anesthesia can be done safely in these cases with premedication and an IV with sedation.

Prepping, Draping and Positioning

The patient is prepped and draped in the routine manner after anesthesia. In liposuction, the position is supine. The blood pressure cuff is applied to the thigh. The arms can be prepped and draped separately and are held by the assistant during surgery. The local anesthesia of tumescent solution is done and the suction is performed comfortably from the axilla and from the pretrochlear area.

The Extent of Liposuction

The extent of suction can include the whole upper extremity except for the medial bicipital area which has very thin skin shrinking abnormally.

Postoperative Care

At the end of the procedure, bandages are applied and a garment, relatively tight around the arm, is applied on top of the bandages.

Transverse Brachioplasty with Liposuction

In relatively moderate cases of arms lipodystrophy, the excess skin is dealt with using an axillary excision. The skin can be excised immediately and be followed by liposuction. The ellipse in the axilla is marked with the arms alternatively extended and flexed in order to check the skin to be removed and prevent tightness. The ellipse is then infiltrated with the local anesthesia solution and the full thickness skin is excised. Liposuction of the whole posterior arm is then performed and the wound is then closed in layers. If the excess of skin is more extensive, it is then necessary to excise an additional central portion of the elevated skin in a longitudinal manner ending up with a T scar which can be of limited length in order to prevent visualization of the scarring and irregularity.

Treatment of this deformity consists of large excisions of posterior skin with the resulting scar placed in a non-conspicuous area such as the medial part of the arm which is hidden when the arm is against the chest. However, in spite of the effort to minimize the visibility of the scar, few people accept such extensive problems. The treatment, which is considered efficacious in cases of extreme obesity, can now be offered in addition to plain liposuction **(Figures 19-9A and B)**.

Postoperative Care

Massages and exercises are allowed approximately a week after surgery.

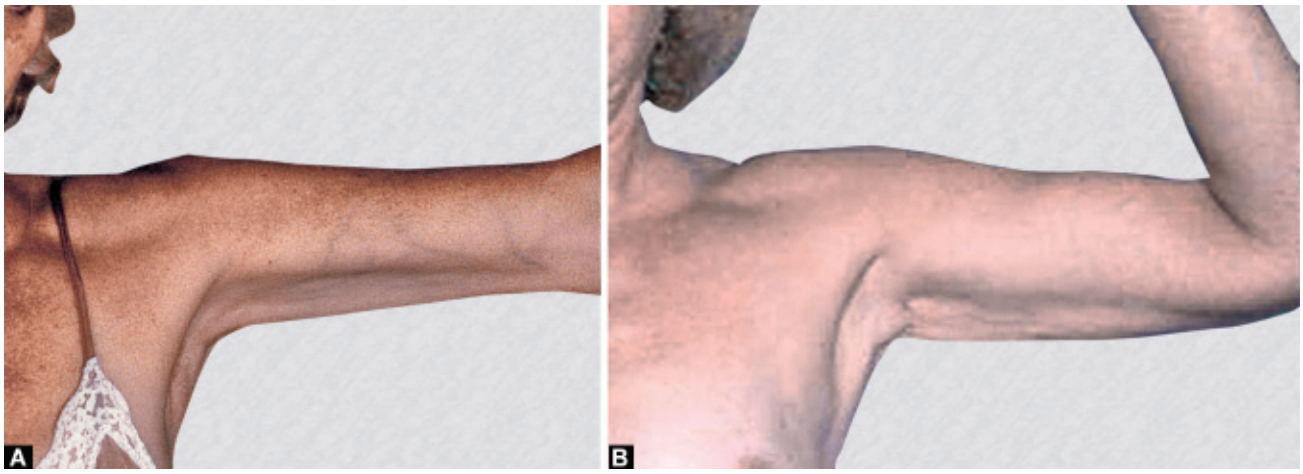
Complications (Table 19-1)

Complications are of two types: (1) Complications associated with liposuction consisting of bruising, hematoma, dents, depressions, irregular areas of skin, and excessive wrinkling of skin in the axilla or medially where the skin did not drape adequately, and (2) Complications associated with the excision lipectomy are the usual ones. They

TABLE 19-1

Possible complications and how to avoid them

Complications	Causes	Precautions to avoid complications
Scar visibility	Anterior migration	Careful defatting
	Posterior migration	Careful placement of the scars. Anteriorly past the humeral groove to obtain a good location
Side widening	Zone poorly suctioned	
Tight irregular zones	Uneven liposuction	



FIGURES 19-9A AND B

(A) A 54-year-old woman with slight lipodystrophy and loose skin; (B) Six months postoperative after liposuction and axillary skin transverse excision

consist of hypertrophic scarring, skin slough, wound breakdown, infections, numbness secondary to the excision of sensory nerves and irregularities secondary to improper skin excision with inaccurate skin draping.

Although these complications are possible and have been noted, they are relatively rare and are not a significant factor in this surgery.

Discussion

The combination of liposuction and lipectomy of the arm is a useful tool in cases where neither of the two procedures would be adequate by itself. Although the scars are extensive and as such are always a problem, this is, nevertheless, the usual technique in patients who have no other alternative. The complications associated with this combination of techniques have been minimal.

20 Liposuction of the Calves and Ankles

Adrien E Aiache

ABSTRACT

The anterior leg liposuction is performed on the prone patient with the legs flexed in order to proceed comfortably. It is often necessary to thin out around the ankles to a maximum and allow more fat in the upper leg at the junction with the gastrocnemius muscle belly. Causes of dissatisfaction include lack of sufficient removal, skin irregularities, asymmetries, edema, pigmentation, pain and hyperesthesias. The technique of liposuction of the calves and ankles is discussed with possible complications.

Introduction

The removal of fat from fatty ankles was first done by Schrudde.[1] This procedure consisted of making an incision in the posterior area of the ankles, then using a curette for removal of the fat below the gastrocnemius muscle. Complications were relatively numerous for the procedure to gain wide acceptance. Before Schrudde, a French surgeon in the early 1900s had done this type of treatment, however, a ballerina treated by curettage ended up with generalized infection and lost her leg.

With the new technique of liposuction the improvement can be quite significant.

Anatomy

In view of the fact that the fascia superficialis is adherent to the muscular fascia, there is no fat deposits and the superficial fat layer presents a dense connective tissue associated with a florid lymphatic system. One needs to use an even fat liposuction to prevent irregularities.

The anterior leg liposuction is performed on the prone patient with the legs flexed in order to proceed comfortably. It is often necessary to thin out around the ankles to a maximum and allow more fat in the upper leg at the junction with the gastrocnemius muscle belly.

Causes of dissatisfaction include lack of sufficient removal, skin irregularities, asymmetries, edema, pigmentation, pain and hyperesthesias.

Indications

Fatty lower legs are an indication when it is present below the gastrocnemius muscle. The appearance of the legs is deleterious to the esthetic in females **(Figure 20-1)**. The problem consists of fat deposits interspersed with some fibrous tissue. It is found mainly in some ethnic groups. The condition worsens with age and it should be distinguished from dependent edema secondary to venous stasis. Palpation and the pinch must reveal an excess of fat since some of the ankle bulk may be due to edema.

FIGURE 20-1
The pinch test is useful in assessing the thickness of the fat layers around the ankles

Contraindications

Older patients with poor circulation, poor vascular supply and extreme venous stasis are a contraindication since the secondary problem can become serious. The skin tone should be showing some adequate elasticity since in some patients with poor circulation and brawny edema, there is a very thick layer of fibrofatty tissue with lymphatic engorgement.

Markings

The patient stands on an elevated stool so the exact amount of fat can be assessed. The area is marked up to the bellies of the gastrocnemius down to the ankle itself and around the Achilles tendon. This zone is extremely difficult since the circulation is poor in the midline above the Achilles tendon and often is a cause of superficial skin loss and even sometimes full-thickness skin losses. The incision is usually made lateral and medial to the Achilles tendon. More anteriorly, some fat deposits may be encountered and they are suctioned through an anterior horizontal foot incision **(Figures 20-2 to 20-9)**.

Anesthesia

Depending on the extent of the suction, anesthesia can be local but more often general. In cases with multiple

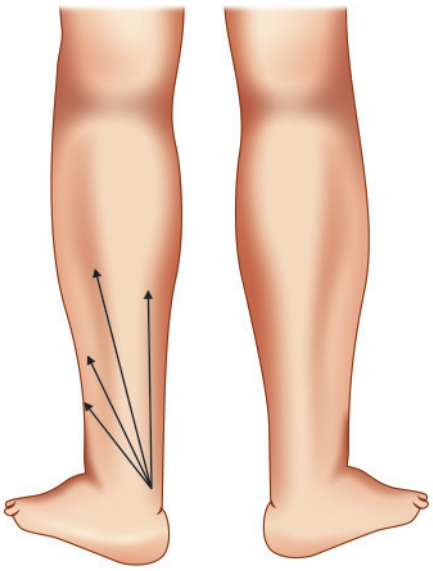


FIGURE 20-2
Incision medial to the Achilles tendon

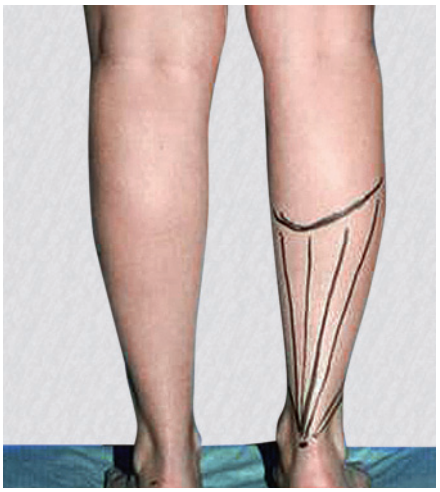


FIGURE 20-3
From a median paratendinous incision, the liposuction is carried out up to the level of the gastrocnemius muscle feathering with a small cannula (3) at the periphery

FIGURE 20-4
Easy access to the ankle and lower leg is obtained through a paratendinous approach either medial or lateral to the Achilles tendon

FIGURE 20-5
Suction of the anterior ankle can be performed anteriorly from any fold in front of the ankle

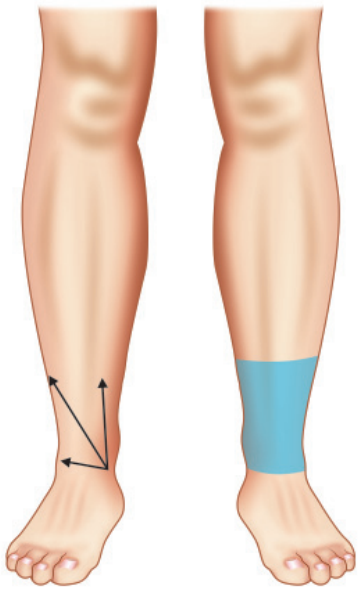
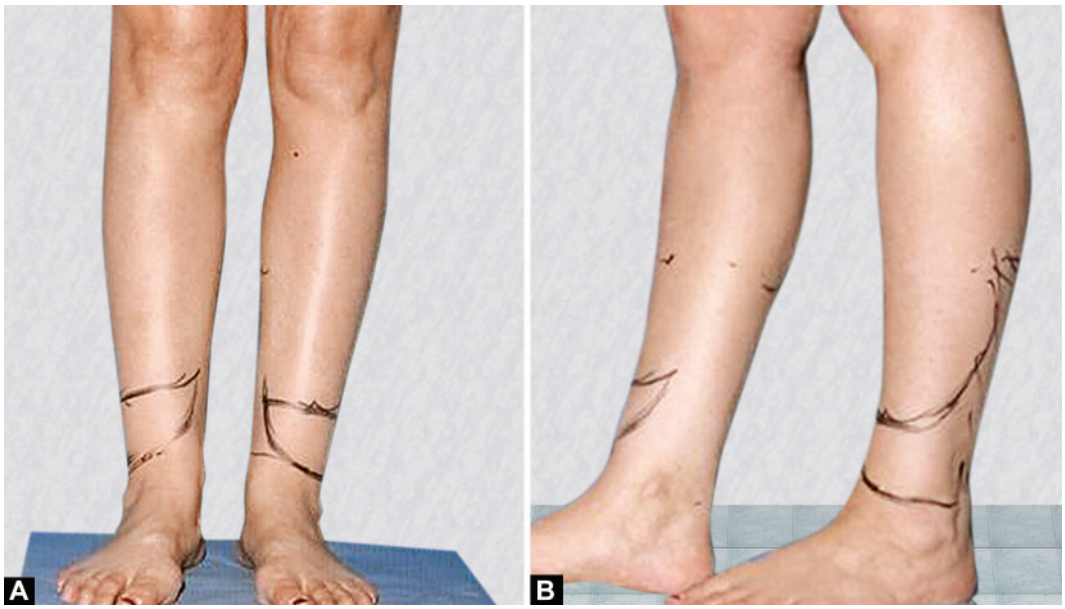


FIGURE 20-6
The suction process is often carried forward around the ankle or can be performed with a secondary anterior incision



FIGURES 20-7A AND B
Notice the extension of the markings anteriorly so the entire circumference of the ankle can be reduced

FIGURE 20-8

Although relatively safe, an external ankle incision is performed, however, be careful about the popliteal nerve

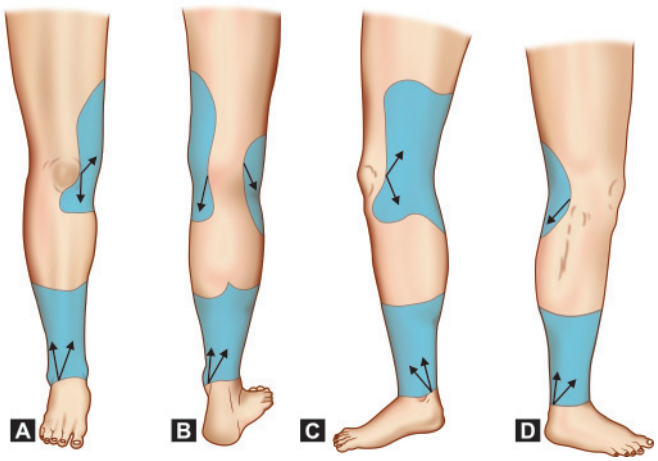
suctioned areas, general anesthesia is preferable and the legs are then infiltrated with the usual tumescent infiltration. In local anesthesia cases, the same anesthetic is used with some sedation.

Instruments

4 mm and 3 mm cannulas are useful. Finer cannulas are used in order to prevent the untoward direction of the cannula immediately below the skin creating dents and longitudinal depressions.

Incisions

An incision lateral to the Achilles tendon in the ankle is used. This should be avoided if the surgeon is concerned about injuring the lateral peroneal nerve. Incision medial to the Achilles is the most commonly used and allow a proper suction of the whole medial posterior area of the leg. A less common incision in the posterior popliteal fold can be useful if there are extremely heavy deposits of fat and the suction is done going downwards. Anteriorly, the incision can be situated at the upper portion of the foot and below the patella, either medially or laterally, allowing then a proper suction in front of the tibial bone and more medially over the tibia where more accumulation can be seen. An additional incision can be made in the lateral



FIGURES 20-9A TO D

Ankle and knee liposuction combined for leg sculpturing. The anterior and posterior midline are marked. If excess is prominent in an area, it is marked with special markings. In addition, the tumescent technique can be used in order to reduce bleeding. An additional incision can be made in the lateral part of the popliteal fold allowing suction of the lateral leg down towards the ankle. In this figure, suction of the knee is done in conjunction with ankle suction. Note the incision in the knee that can be used for suctioning of the whole leg anteriorly and posteriorly as well as the ankle incision and can be used circumferentially for the whole ankle

or medial part of the popliteal fold and this allows suction of the lateral leg and ankle **(Figures 20-10 and 20-11)**.

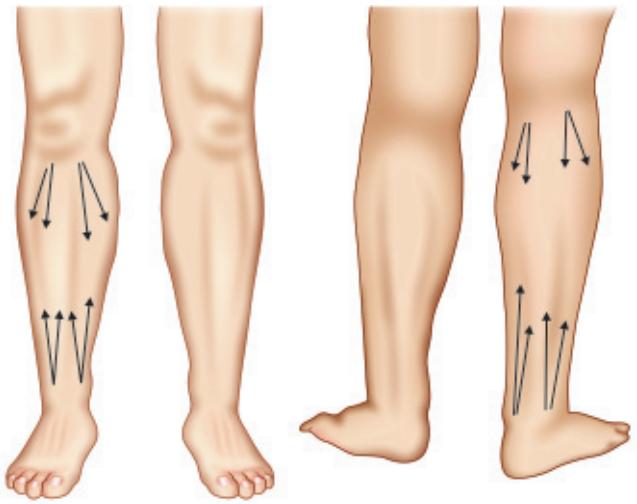


FIGURE 20-10

Bilateral incisions in the anterior ankle and knees as well as in the posterior calves and knees allows complete circumferential liposuction

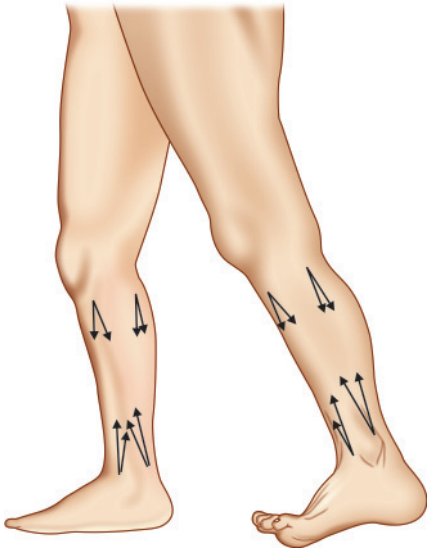


FIGURE 20-11
Medial and lateral incisions

FIGURE 20-12
Elastoplast can be applied in a crisscross fashion avoiding circulating taping, however, compressive garments are preferred immediately postoperatively

Technique

The procedure is performed most often on the patient prone and the anesthesia is infiltrated. Then the usual "sawing wood" motion of the cannula is used in parallel tunnels done in order and methodically in each tunnel, trying to be even in the suction process. Proper progression of the suction is checked continually by palpation and observation using the pinch test and the flat palm of the hand to assess the remaining thickness of the skin below, on top of the cannula, and below the hand. Although this defatting is adequate in most of the cases, it has been found that vigorous defatting suction is necessary to achieve a remarkable difference in the shape of the ankles in some cases. Aside from circulatory problems immediately on top of the Achilles tendon, no other untoward effect has been seen from strenuous suction. In other words, superficial suction is indicated in these cases and it is the only possibility in the leg. While 0.5 cm is sufficient around the ankle, 1 cm will be necessary in the upper leg supposed to be larger in volume than the lower leg. To improve on the exact shape of the results, a computer suction machine can be used. It helps in comparing the fat removal on both sides (LS 1000 aspirator by MD Engineering, CO2536, Barrington Co. Hayward, CA 94545) **(Figures 19-12 to 19-14)**.

Refinements

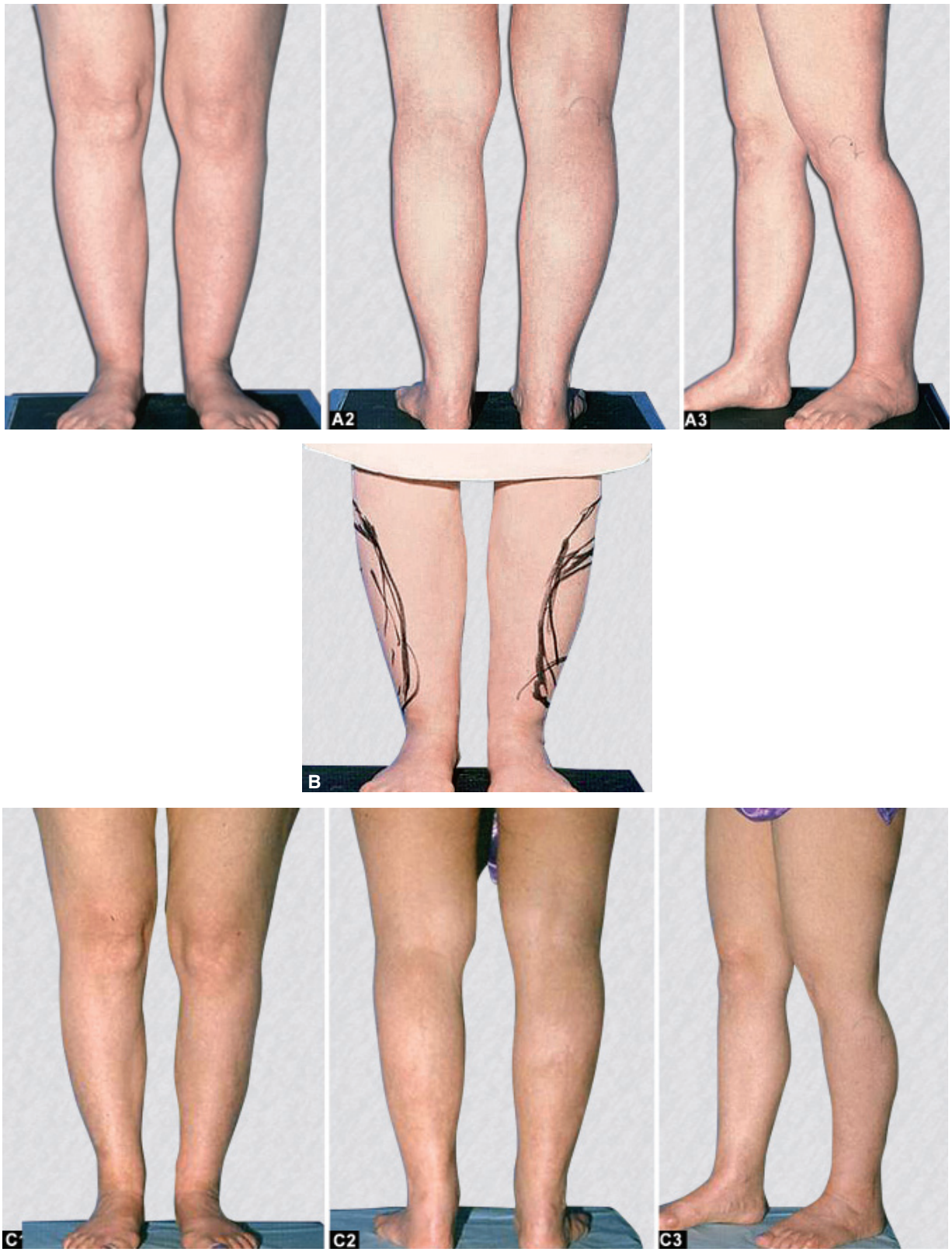
Feathering at the junction of the defatted and non-defatted areas is performed with finer cannulas and either minimal suction or no suction at all. In addition, proper defatting in a less aggressive manner is done anteriorly and at the lower edge of the gastrocnemius muscle. The refinements are made using a Robles 2.4 or 3 mm cannula with either one or three openings. A proximal tourniquet can be sometimes used when large amounts of fat have to be removed, however, this has a negative effect of extreme bleeding when it is released at the end of the procedure in each leg. However, this technique has been suggested by some and under proper circumstances, it might be useful **(Figures 19-15 to 19-18)**.

Postoperative Steps

Compression and massaging of the area is useful to reduce the edema postoperatively. Once complete, defatting has been obtained and the incisions are closed with absorbable sutures reinforced by Steri-Strips, a garment can be applied in addition to Ace bandages to prevent deep vein thrombosis. The patients are asked to ambulate ad lib and are allowed to have moderate activities. The compressive garments are the most useful. A support hose often reinforced by Reston foam is used sometimes (Ali Med, 297 High Street, Dedham, MA 02026) and kept in place with a 6 inches Ace bandage **(Figure 20-12)**.

Postoperative Care

Patients are treated with prophylactic antibiotics as well as pain medication, asked to stay off their feet or ambulate, and are not allowed to have their legs folded



FIGURES 20-13A TO C

(A) Preoperative 36-year-old woman with ankle lipodystrophy; (B) The lateral leg fatty excess marked for liposuction; (C) Six months postoperative. Notice the larger knee and ankle on the left side. A more intensive liposuction in the left medial malleolus area might have improved the results. Note the persisting discoloration and bruising of the posterior leg

FIGURES 20-14A TO C

(A) Preoperative 46-year-old woman with ankle lipodystrophy. Notice the markings for the liposuction up to the gastrocnemius; (B) Six months postoperative showing the improved ankle shape but also some mild irregularities in the texture of the legs; (C) Five years postoperative. The patient has gained 15 pounds of weight and has the same circulatory difficulties with skin breakdown and discoloration

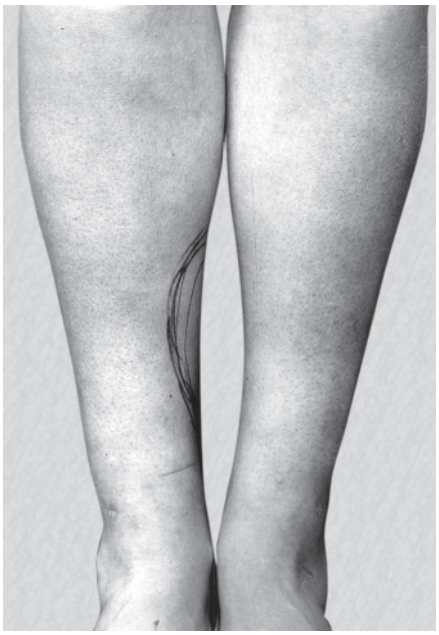


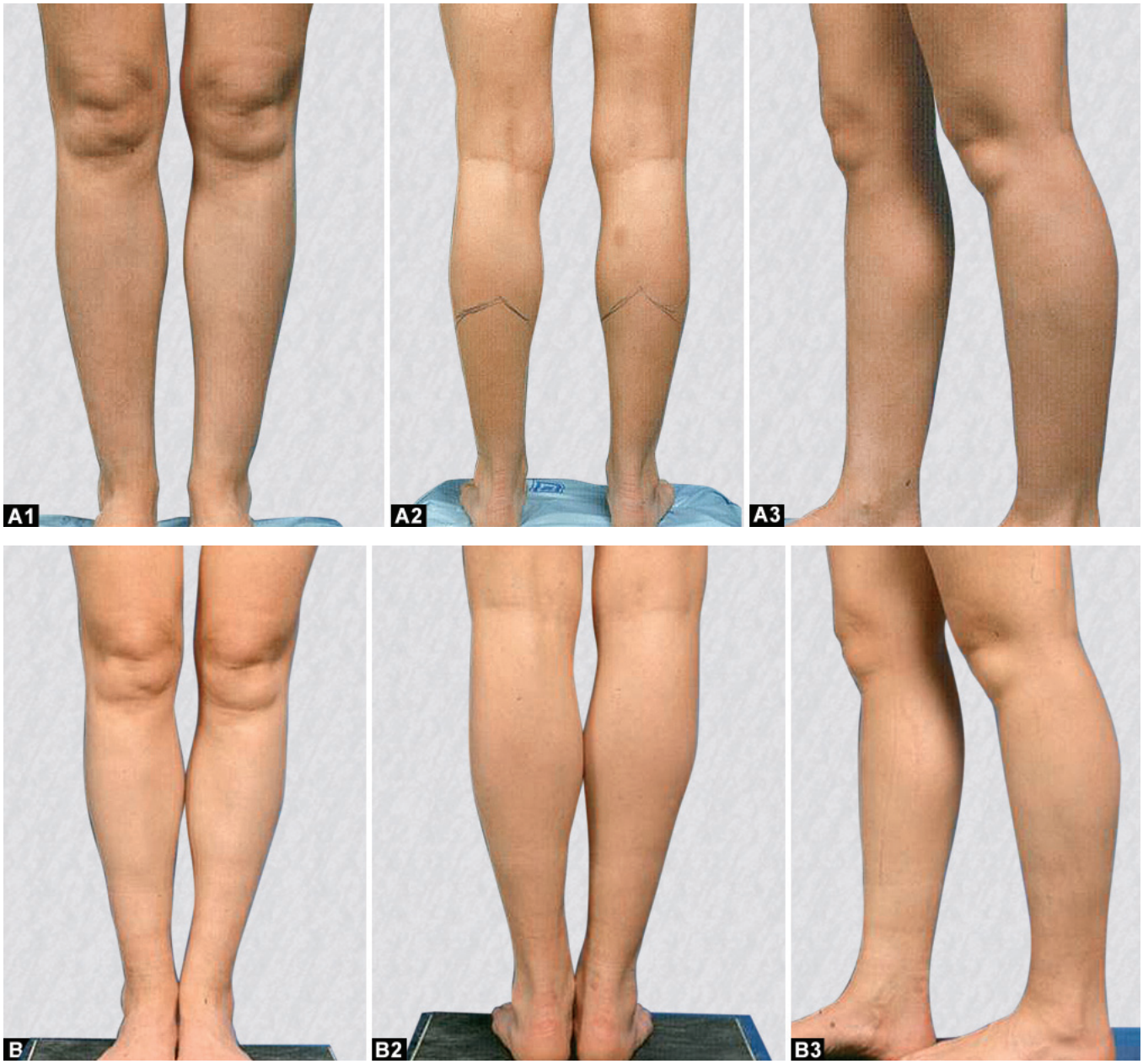
FIGURE 20-15
In checking the postoperative appearance during liposuction, it is often necessary to compare the legs by juxtaposition. The placement of a straight rule between the legs give an adequate estimation of the results

FIGURE 20-16
At surgery, the patient has the legs flexed to evaluate the size and shape of the calf and compare it with the opposite side. It is important to avoid step deformities due to a sudden change in the fat thickness

FIGURE 20-17
Anatomically there is only one layer of fat between the muscular fascia and the skin. It behooves the surgeon to remain even during the suctioning. The anterior leg suction is accomplished on the prone patient with leg flexed. It is often necessary to thin out around the ankles to a maximum and allow more fat in the upper area when it reaches the gastrocnemius muscle

FIGURES 20-18A AND B

(A) Preoperative 32-year-old woman with ankle lipodystrophy; (B) Six months postoperative. There is improvement in the posterior curve and the anterior ankle bulge. Note the excessive pigmentation and discoloration taking months to improve



FIGURES 20-19A AND B

(A) Preoperative 27-year-old woman with circumferentially heavy legs, anterior view; (B) Six months postoperative after liposuctioning 225 cc of ft from each leg

FIGURES 20-20A AND B

(A) Preoperative 36-year-old woman with ankle lipodystrophy; (B) Postoperative. Note the improvement in the ankle contour

and be immobile. It is well-known that ankle suction is the most painful after surgery since the ecchymosis, edema, and post-traumatic reactions are unable to drain downwards. The swelling and edema gives burning sensations and difficulties in ambulation. Eight to ten days after surgery, massages are encouraged as well as exercises, drainage by elevating the legs, whirlpool treatments and massages. The compressive stockings are worn for an extended period of time, sometimes up to 6 months. Patients will quickly learn to use them for their own comfort. Sequential compression devices are used to lessen the edema. They are started after surgery and can be continued at home. The devices are applied from the ankles to the lower thighs.

Circumferential Ankle Liposuction

Using the posterior and anterior approaches, circumferential suction is used in fatty legs when a definite increase in the anterior fat layers is palpated. It is performed with a #4 or 3 mm cannula. It is safe depending on the specific vascular condition of the patient. Caution is advised in older patients with poor vascular status for fear of local skin slough and venous stasis and thrombosis. Through four incisions, the suction is then performed and the upper incision can reach the ankle and should crisscross the anterior midline. A combination of a long 4 mm cannula and a 3 mm cannula is sufficient to obtain good suction. Continuous feeling and the pinch test will direct such a process and combined with repeated inspection and palpation, it will allow proper results and long-term postoperative results **(Figures 20-19 and 20-20)**.

Contraindications for ankle liposuction are given in **Table 20-1**.

TABLE 20-1

Ankle liposuction contraindications

❖ Circulatory problems
❖ Varicose veins
❖ Ankle edema
❖ Raynaud's syndrome
❖ Lymphedema
❖ Hypertrophic gastrocnemius muscle
Comments
❖ Ankles with pitting edema should be a contraindication (Lymphatic or venous incompetence can be the cause)
❖ The skin tone should be showing adequate elasticity otherwise liposuction is not advised

TABLE 20-2

Liposuction complications

❖ Insufficient removal
❖ Excess removal and dents
❖ Pigmentation
❖ Edema
❖ Pain
❖ Hypoesthesia
❖ Uneven or unequal
Remedies
❖ Remove "plenty"
❖ Conservative allows only token improvements
❖ The skin should be 0.5 to 1 cm thin "all around"

Complications

Some possible complications include infections, irregularities and nerve injuries **(Table 20-2)**. Complications that are more common are swelling, excessive pain for an extended period, some areas of irregularities, extreme bruising and long-term duration pigmentation.

Discussion

Liposuction has been found to be extremely useful in cases of lipodystrophy of the lower legs. This technique can bring dramatic improvement to these cases. Contraindications are well-known and they include old age with circulatory problems, varicose veins, ankle edema, Raynaud's syndrome, lymphedema and so on.

Determination of the exact desire of the patient will determine the amount of fat removal. An aggressive suction may lead to irregularities in the ankles but the overall results will be better than cases that are done too conservatively.

Reference

1. Schrudde J. Lipexeresis as a means of eliminating local adiposity. Aesthet Plast Surg. 1980;4:215-26.

21 Facial Liposuction

Adrien E Aiache

ABSTRACT

Facial aging results in fat loss in some areas and excess fat in others. These volume increases in the fat distribution can be treated by liposuction or by surgical removal. The localized decrease of the fat can be treated by collagen or by additional increments of fat deposition. These combination of treatments is done in blepharoplasties, face-lifts and the malar, submalar, mandibular and chin implants. The treatment of special problems concerning malar bags, Bichat and lateral buccal fat pads, sub-platysmal liposuction, periorbital fat, melolabial fat, and jowls is discussed.

Introduction

Multiple changes occur during aging. The most important consists of the relaxation of the skin on its bed and attachments over the superficial muscular and aponeurotic system (SMAS). A second important change happens when the deposits of fat situated in the young face change in volume and vary in shape with aging. These variations consist of alterations of the volume in the subcutaneous and sub-SMAS fat deposits and specifically the decreased volume of the fat and soft tissue in different spots. The areas of change in the facial appearance consist of the following:

1. There is a decrease in the fat surrounding the mouth causing wrinkles and deep lines situated along the skin plications during speech and smiling and lip pursing.
2. There is an increase in the fat situated below the eyebrows over the periosteum consisting of the retro-orbicularis oculus fat (ROOF) as well as an increase in the fat situated in the infraorbital area consisting of the sub-orbicularis oculus fat (SOOF).
3. There is a decrease in the fat in the ear lobules causing lengthening and distortion of the lobules with wrinkles.
4. There is an increase in the fat situated under the chin and over the platysma giving the so-called double chin deformity and there is an increase in the fat situated under the platysma aggravating the conditions of double-chin or "turkey-gobbler".
5. There is a decrease in the fat situated under the malar bones and lateral to the nose causing a triangular depression in the middle cheek area.
6. There is an increase of fat in the jowls causing redundancy associated with skin laxity which is blocked by the retaining ligaments of Furnas in the chin area.
7. There is decrease in the upper forehead area causing deep frown lines.
8. There is a decrease in the temporal fat pads causing a gaunt appearance of the face.
9. There is sometimes a decrease in the orbital fat cushions causing a cadaveric appearance of the eyes although at other times there is an increase in these fat pads causing palpebral bags.

These volume changes in the fat distribution can be treated by liposuction or by surgical removal. The localized decrease of the fat can be treated by collagen or by additional increments of fat deposition. These combination of

treatments is done in blepharoplasties, face-lifts and the malar, submalar, mandibular and chin implants. All these processes are combined to improve and rejuvenate the face.

Indications (Table 21-1)

- Early facial aging
- Fatty face and neck
- Postoperative unsatisfactory meloplasty (neck and jowls only)

TABLE 21-1

Indications for procedures in facial liposuction

Illouz division
❖ Early stages of aging: Suction of the cheeks, jowls, chin and neck.
❖ Middle stage of aging with moderate skin redundancy and sagging: Liposuction and mini-lift.
❖ Advanced stage of aging with skin excess, sagginess, and wrinkling: Liposuction and complete meloplasty.
Aiache division
❖ Early and middle stages of aging: Liposuction alone.
❖ Middle and advanced stages of aging: Liposuction and complete meloplasty.

Contraindications

- Postoperative meloplasty which could give poor scarring
- Thin face
- Sagging face (old face)

Principles

In the past, early facial aging was treated through localized area treatments, such as excisions of the nasolabial fold, of the redundant skin of the chin with horizontal excision or through the Z-plasty, and localized excision of the area of the cheeks with a mini-lift technique. Injections, such as the now outlawed silicones or the new collagens, are used as well as the techniques of chemical peels and dermabrasion.

In spite of these localized and limited modalities, the best treatment for early facial aging is actually the face-lift procedure.

With the advent of liposuction, the treatment has made great strides; however, there are limitations and facial liposuction-only gives the same clinical cosmetic results as the so-called mini-lift. Problems with the limited surgical treatments and mini-lifts are the scarring which is unwarranted on younger patients, especially males, who often have a tendency to heal by hypertrophy and have difficulties with limitations that the scarring poses on their hairdo. These hypertrophic scars are most likely due to the abundant amount of elastin and connective tissue present in younger patients. Liposuction of the face alone has brought a new weapon in the fight against facial aging **(Figures 21-1 to 21-13)**.

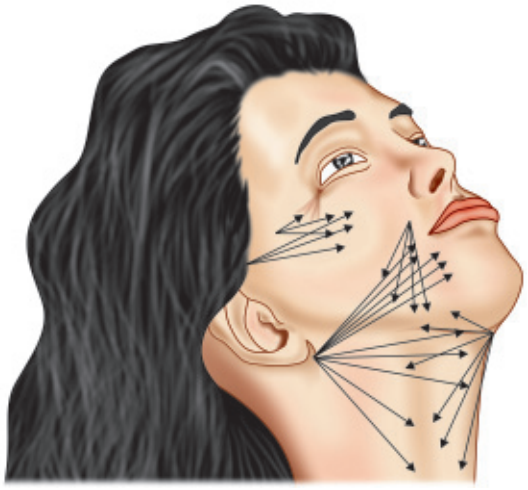


FIGURE 21-1

The first step consists in liposuction of the cheek and neck. A submental incision of 4 mm and a retroauricular incision of 4 mm is used for the procedure

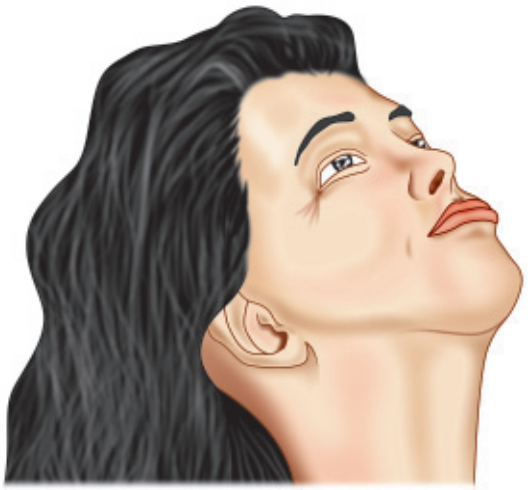


FIGURE 21-2

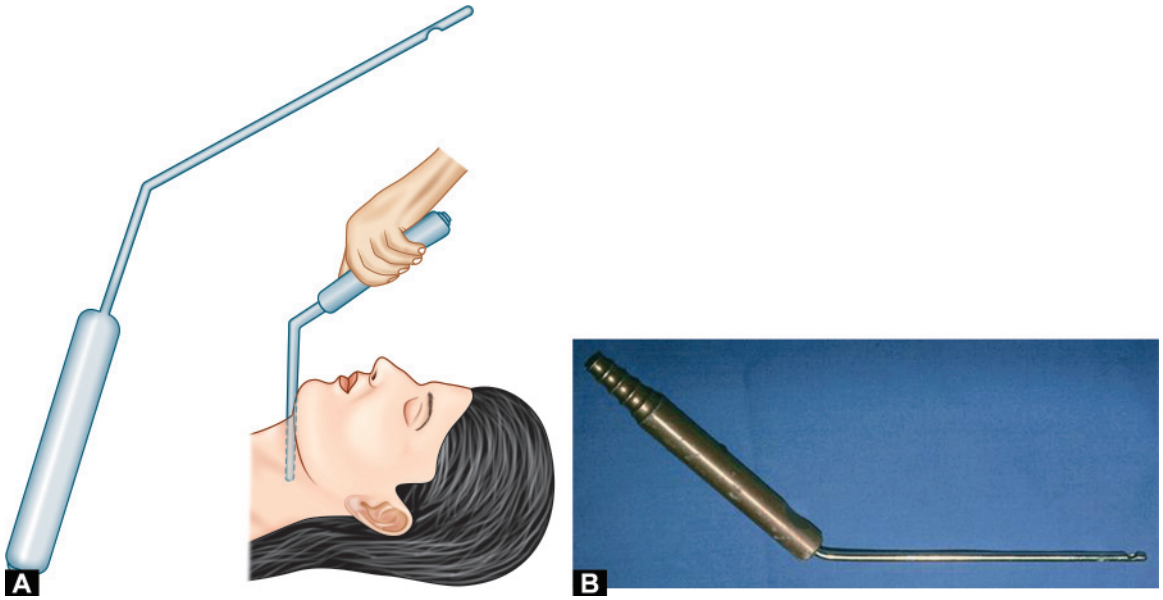
Liposuction of the chin and cheeks through a chin incision of 4 mm that usually allows extensive neck and lower face liposuction

FIGURE 21-3
Liposuction, through a 3 mm incision, of the chin and neck is accomplished by liposuctioning parallel with closely adjacent tunnels

FIGURE 21-4
Liposuction is used alone for de-fatting the cheeks, jowls and chin. Liposuction can extend to the lateral nasolabial area. It is either done alone or in combination with face-lifting

FIGURE 21-5
With an angles cannula, it is possible to liposuction a large part of the face including the jowls, nasolabial area and neck

FIGURE 21-6
Under local anesthesia, the whole chin and neck, as well as he lower face, is essentially liposuctioned using an angled 4 mm cannula



FIGURES 21-7A AND B
Angled cannula

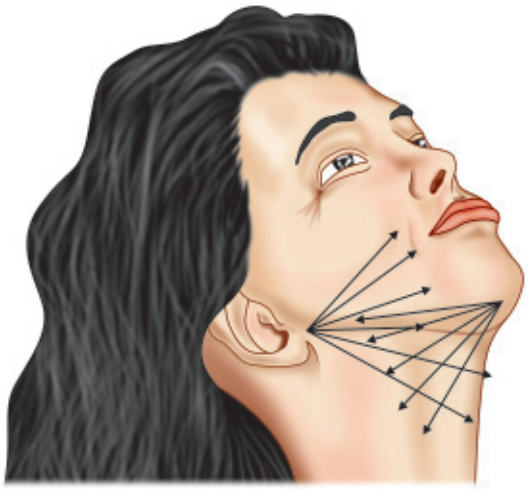


FIGURE 21-8
Through an inferior earlobe incision, the liposuction process is continued and allows crisscrossing of the liposuction

FIGURE 21-9
The combination of two incisions allows crisscrossing liposuction assuring a more homogenous removal of fat

FIGURE 21-10
Facial liposuction in the unsatisfactory postoperative face-lift patient. The preauricular and chin approach are indicated. The cannula is introduced through a 4 mm incision in the preauricular area, preferably at the anterior earlobe

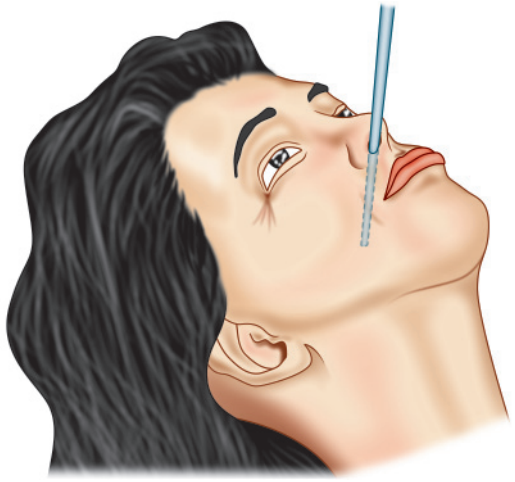


FIGURE 21-11
To facilitate liposuction of the anterior cheeks and the melolabial area, an incision is made in the nostril sill

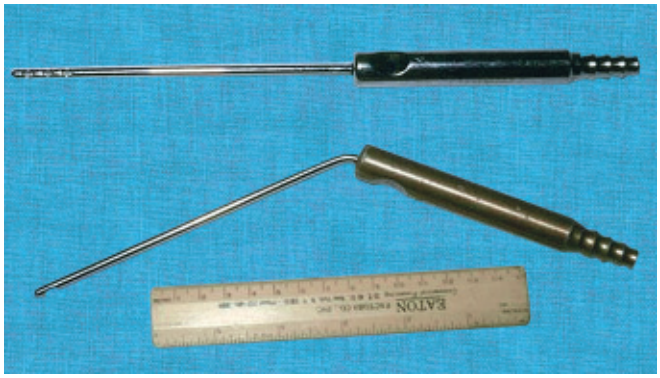


FIGURE 21-12
Instruments moat commonly used for facial liposuction: 4 mm angled Aiache cannula, 4 mm Fournier cannula 4 mm with 3 holes

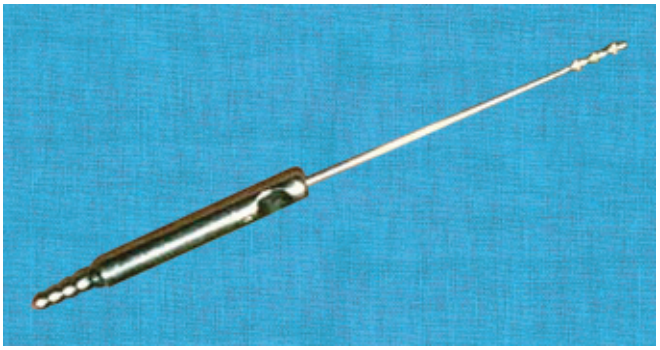


FIGURE 21-13
Thinner cannulas, 3 mm, with multiple openings are used most of the time in facial liposuction. They allow a fair amount of liposuction in spite of their reduced diameter

Patient Selection

Indications

Younger adults, particularly those with chubby faces that show only signs of sagginess and chubbiness of the cheeks, jowls and neck, and those with a large submental bulge and a large mandibular angle bulge which obliterates the definition of the mandible. This problem is especially distressful in males. In addition, there are patients presenting with large Bichat's fat pads creating the "chipmunk" face.

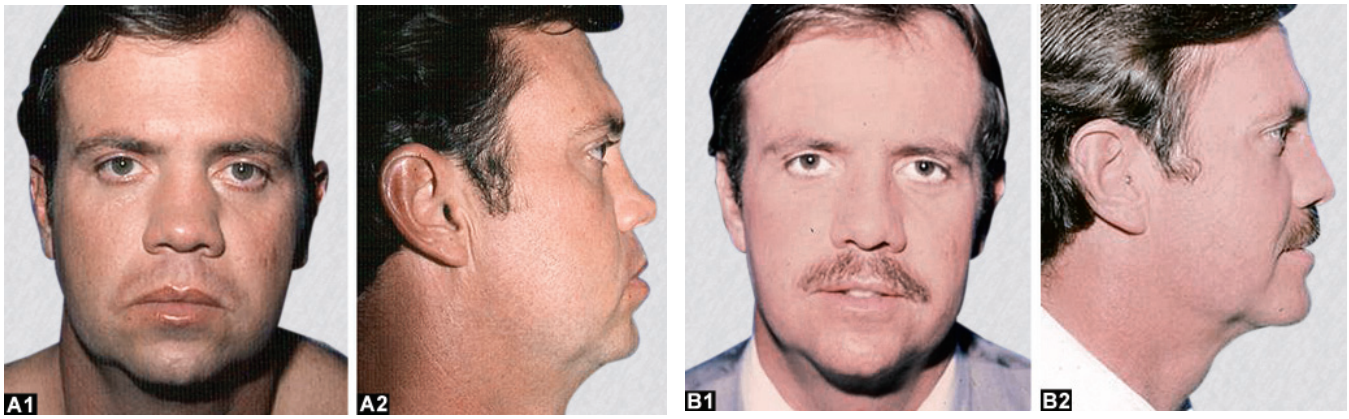
The physical examination is done with the patient in the standing position and smiling with neck flexed and extended.

Evaluation of the areas to suction is done. The mandibular border is marked in order to correct the jowls properly. Note that since the jowls move up in the lying position, they must be marked while the patient is sitting up. Cases involving the nasolabial area also are marked carefully noting that some areas may be more prominent in the standing position **(Figures 21-14 to 21-17)**.

One also has to be careful about the area just below the chin border since often suction of the chin area can

FIGURES 21-14A AND B

(A) Preoperative 42-year-old female. (B) Postoperative following facial liposuction of the cheeks, neck, jowls, and nasolabial areas. Note the more acute nasolabial fold resulting form emptying the melolabial fat



FIGURES 21-15A AND B

(A) Preoperative male. (B) Postoperative showing improved jowls and neck and accentuation of the nasolabial groove

FIGURES 21-16A AND B

(A) Preoperative 54-year-old woman with facial redundancy, severe wrinkling, and moderate tissue flabbiness. (B) Six months postoperative after liposuction without skin excision

FIGURES 21-17A AND B
(A) Preoperative patient. (B) Postoperative

leave a second little double chin. The area below the malar bones is marked in the same fashion if someone is interested in obtaining a hollow cheek appearance. As mentioned, the markings are made in advance in the sitting position **(Figures 21-18A and B)**. At the limits of the line encompassing the whole facial area from the anterior auricle area down to the anterior portion of the sternocleidomastoid muscle, extending superiorly to the zygomatic arch with its apex at the nasolabial groove. Medially, it extends below the edge of the nasolabial groove to the lateral commissure of the mouth and down inferiorly to the midline joining the opposite area. The nasolabial area lateral to the groove or melo-genial groove and superior to the fold is marked. The jowls are marked in the erect position, as mentioned.

The pinch test is useful all along during appreciation of the fat. Cross-hatching marks are made in the most prominent areas and the most wanting spots.

FIGURES 21-18A AND B
Markings of the area lateral to the melolabial bulge and jowls for facial liposuction

Anesthesia

Similar to the choice of anesthesia for face-lifting procedures, the anesthesia in pure liposuction of the face could be either local or general with infiltration of epinephrine to reduce bleeding.

Incisions

A 4 mm incision is made under the chin behind a crease. A second incision is made behind the ear lobule on either side. A third incision is sometimes necessary in the temple to be able to crisscross the suction during suction of the malar prominence if it is necessary. One could also use the crow's feet line for incision. Finally, an incision can be made in the nasal vestibule or externally at the apex of the fold of the nasolabial area.

Surgical Technique

The patient is prepped and draped, and after anesthesia is infiltrated, the first incision is made under the chin using an angled Aiache cannula or a straight Fournier 4 mm cannula and liposuction of the whole chin area is done going laterally as far as possible. A counter-suction is done from the posterior earlobe area crisscrossing the suction in the neck. This incision allows ascending toward the jowls and superiorly toward the corner of the mouth and malar bone. Fan-shaped suction is done with multiple strokes until a proper improvement has been obtained. The cannula can be turned laterally on either side to thin out the skin as much as possible in some areas. Multiple strokes are performed until the surgeon is fully satisfied by the resulting thinness obtained under control **(Figure 21-19)**. The cheeks and the jowls are suctioned thoroughly. The jowls are done with extreme care since they are difficult to correct. Another specific area is lateral to the oral commissure, where it involves a deposit of fat over

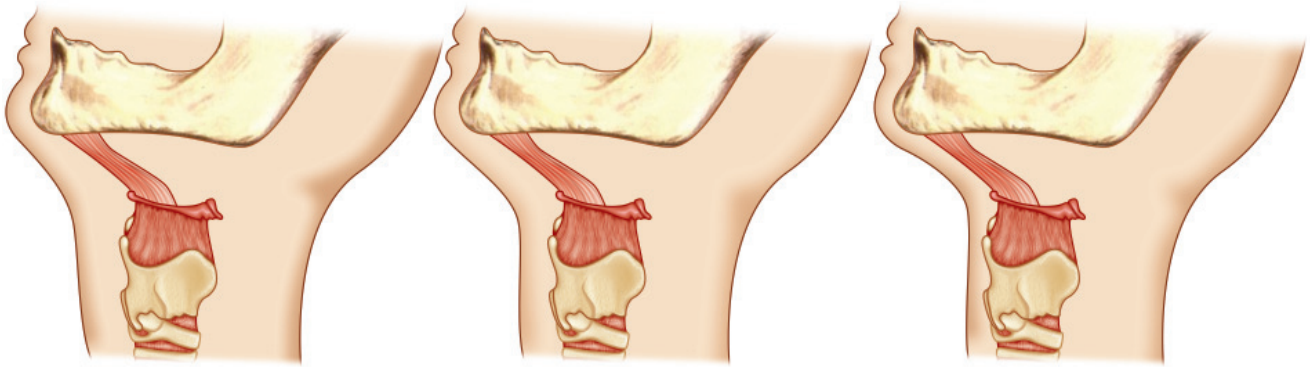


FIGURE 21-19

Neck suction lipectomy. Depending on the height of the hyoid bone in relation to the mandibular ramus, the removal of fat liposuction will achieve different results in the contour of the neck. A low hyoid bone will prevent a sharp angle in the profile view

the folding of the geniolabial muscle and lateral to it. The liposuction in this area can possibly end with depressions along the skin attachments to the muscle; however, it improves the deposits of fat situated in this zone **(Figure 21-15)**.

Refinements

Feathering various areas, especially the malar area just above the cheeks and in the nasolabial prominence is necessary to improve the look. Tiny incisions are added in the zygomatic area and in the chin prominence to reduce the whole volume of soft tissue of the chin. The refinements can be an additional benefit in cases of the "witch's chin look" that is sometimes obtained after complete de-fatting of the neck when there is hypertrophy of the chin and a drooping chin.

Closure is performed absorbable sutures and Steri-Strips are applied.

Dressings

Patients are dressed either with a 4 inch Ace bandage around the face and neck or special facial masks that have been developed and are useful in this early postoperative period.

Postoperative Care

The patients are discharged and are able to go home with antibiotics and pain medication. They are encouraged to wash their face as soon as possible and apply the mask to prevent swelling of the tissues. After ten days, they are allowed to have massages and sometimes ultrasound.

Discussion

Liposuction of the face is a new modality of treatment of early facial aging. Although limited in its scope, it is done by some surgeons who want to improve the patient's facial sagginess and fat excess without having the scars that are given by the face-lift procedures **(Figures 21-20A and B)**. The revival of this technique using ultrasound suction is underway.

Conclusion

This technique is useful in well-indicated cases and will bring satisfactory results with a complete absence of scarring.

Special Areas

Malar Bags

Although sometimes improvement can be obtained by wide, low skin undermining, the malar bag area can also be improved by liposuction through two incisions. It can also be improved by individual incisions: (1) Crow's feet line, (2) during a meloplasty procedure and (3) during a blepharoplasty procedure.

Malar bags lipodystrophy is often a difficult problem **(Figures 21-21 to 21-24)**, although some attempts have been made to accomplish de-fatting of the inferior border of the orbit, it usually does not give an acceptable result. Another way consists of elevating the inferior lid skin flap that allows the technique. The development of the mid face-lifting has put a new interest in this zone. Liposuction can be useful in many instances.

FIGURES 21-20A AND B

(A) A 36-year-old woman with facial redundancy and lipodystrophy. Note the lack of definition or angularity in the features. (B) Six months postoperative

FIGURE 21-21

A 48-year-old female with malar bags (sub-orbicularis oculus fat excess)

FIGURE 21-22

Markings for facial liposuction of the cheeks, neck, chin and jowls on a 44-year-old female

An approach that be sometimes used is the pyriform area incision through the buccal vestibule. The liposuction is done in the usual way reducing the malar bags protuberance until a satisfactory appearance is obtained.

Bichat Fat Liposuction

The indications for Bichat fat pad suction consist of the chipmunk facies (excessive fatty deposits in the lower area of the cheeks) which cannot be properly improved even after face-lifting. In these cases, it is useful to reduce these areas in order to sculpture the face properly **(Figures 21-25 to 21-27)**.

Anatomy

The fat pad was described by a French surgeon, Bichat. It consists of a fat pad situated in the cheek between the masseter muscle and the buccinator muscle under the SMAS. It has an upward extension into the zygomatic fossa and the temporal fossa. It is related to Stensen's duct and to the facial nerves as well as the facial artery

FIGURE 21-23
Malar bag or sub-orbicularis oculus fat suction lipectomy can be performed through a blepharoplasty incision

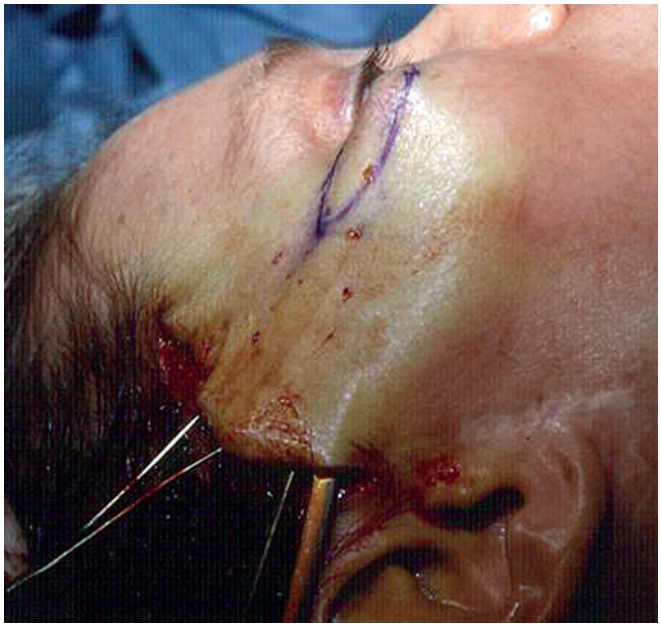


FIGURE 21-24
It is possible to do cheek liposuction and in some cases malar bag or sub-orbicularis oculus fat liposuction through a face-lift incision

and vein. This fat pad is surrounded by a capsule that has to be broken in order to extirpate the fat. Its existence facilitates the motion of chewing. The surgical approach is performed either through the mouth or through a face-lift incision when the deep face-lift technique is used. The fat pad is not to be mistaken for the jowls which are the consequence of skin ptosis with some adipose tissue plicated and blocked by Furnas

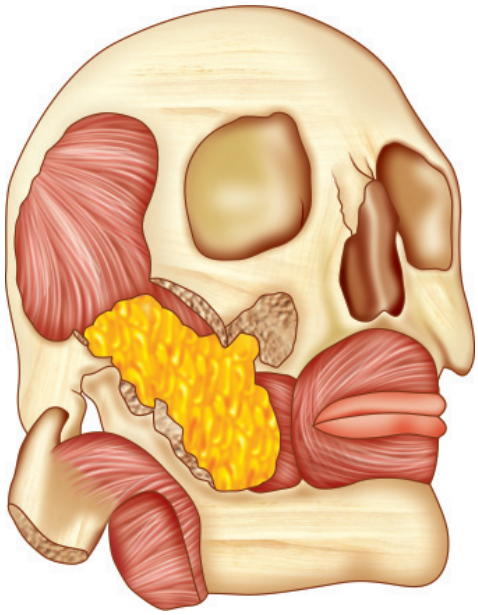


FIGURE 21-25
Bichat's fat pad

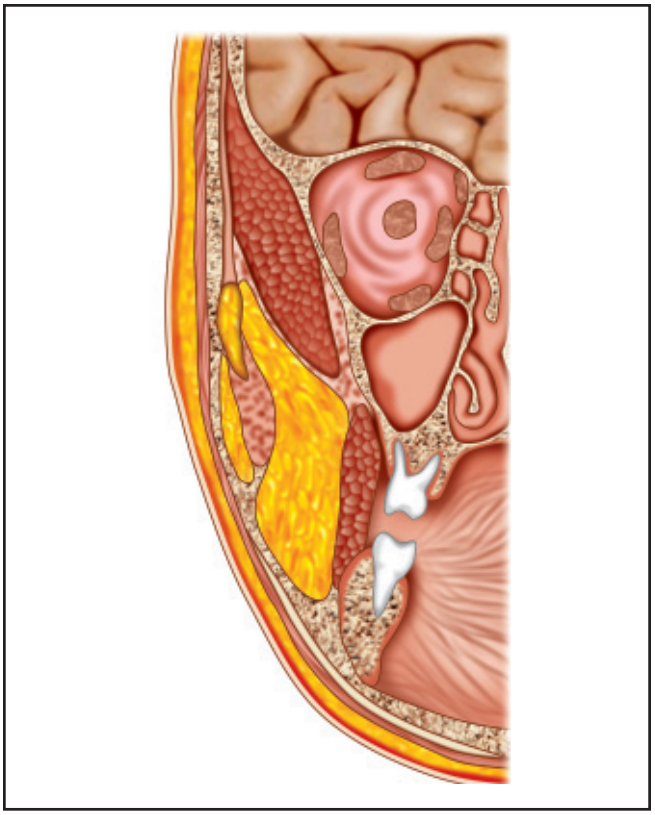


FIGURE 21-26
Cross-section of skull and facial bones showing Bichat's fat pad and its relationship to the facial musculature

FIGURE 21-27A AND B

(A) Preoperative 56-year-old female with Bichat's fat pad. (B) Postoperative following face-lift and liposuction of Bichat's fat pad

ligament. The removal of the fat pads accentuates the malar prominence giving a hollow-cheek look that many women are interested in. Some patients having excess fat pads have the chipmunk appearance. The incision for the approach to the fat pad is either superior or inferior to Stensen's duct. During surgery, care is taken to identify the orifice of Stensen's duct. If the opening is difficult to identify, massaging the parotid gland gently will allow saliva to indicate the exact opening.

Caveats

It is imperative to do a careful suction since excessive removal of the fat can create unsightly depressions and thinning of the cheeks giving a cadaveric appearance. This is especially true if this fat pad is suctioned on patients who have insufficient skeletal support to their facial architecture.

Markings

Markings are made on the cheeks. The markings are also made in the buccal mucosa mainly above or sometimes below Stensen's duct for the approach.

Technique

During the face-lifting approach, the technique consists of elevating the skin flap deeply until the fat pad is demonstrated. This type of approach is done when the undermining is extensive up to the fat pad area.

Through the intraoral route, the approach can be done in conjunction with a face-lift or without it. The incision is made over the premolar in the superior sulcus and introducing the cannula immediately in the fat pad area; the suction is turned-on. The fat pad is teased out of the oral cavity with suction and pick up. If it does not show right away, spreading the tissues with a clamp to avoid cutting the facial nerves is done until the fat is visualized. A sufficient amount of fat is removed using a combination of teasing out the fat and suction. The mucosa is then closed with absorbable sutures or silk.

Complications

The two most common cause of complications consist of nerve damage and depressions.

Nerve damage is only occurring when an aggressive suction is performed either by the intraoral route or the face-lifting approach. It is usually transient and a full recovery occurs within a few months.

The most devastating complication consists of depressions and emptying of the cheeks with excessive fat pad suction, in cases where a facial suction is done in addition to face-lift.

Aside from avoiding such problems, the treatment consists of repeated autologous fat injections to restore some of the contour of the lower jaw.

Sub-platysma Liposuction

Sub-platysmal fat suction is beneficial on younger patients and can be performed with facial suction and pre-platysmal fat suction. By contraction of the platysma muscle, evaluation of the fat situated over and under it can be performed. Relaxation of the platysma will allow the pinch to grab the pre- and post-platysmal fat; as the pinch will only grab the pre-platysmal fat when the platysma is contracted. If the platysma is flaccid, it should be tightened or excised at the time of surgery. If it is thick and shows a short neck with an open cervical angle, the excision or plication is necessary in addition to face-lifting. Platysmal surgery is more efficient when associated with face-lift.

Another useful approach in the pre-platysmal fat problems is the release of the hyoid muscle which is attached to the mandibular border through the geniohyoid

muscle. This can be released in releasing the origin of the geniohyoid muscle just below the mandibular border. Thus, allowing the hyoid bone to snap backward, creating a better angle under the chin.

Indications for Sub-platysmal Fat

Patients are selected for the procedure by assessing the fatty excesses present over and under the platysma. The indication for sub-platysmal fat suction is derived by assessing the amount of fat present under the muscle using the technique mentioned above.

Sub-platysmal fat suction is of benefit on younger patients and should be performed with facial suction by attempting to judge if the pre-platysmal suction is sufficient. By contraction of the platysma muscle, evaluation of the fat situated over it and under it can be performed. Relaxation of the platysma will allow the pinch to grab the pre- and post-platysmal fat; however, the pinch will only grab the pre-platysmal fat when the muscle is contracting. If the platysma is flaccid, it should be tightened and/or excised at the time of surgery. If it is thick and shows on a short neck with an open cervical angle, the excision or plication is necessary in addition to face-lifting. Platysmal surgery is more efficient when associated with a face-lift done in attempting to treat it by localized surgery under the chin.

Caveats

Although it is obvious that the sub-platysmal fat will improve the chin angle; it is, nevertheless, a problem and only by releasing the hyoid bone it can be improved completely if sub-platysmal fat suction is not successful. This technique can become dangerous when encountering vessels and nerves adding complications to the original procedure. Sometimes under direct vision, the platysmal membrane is incised after the enlarged chin incision has been made exposing the whole neck area. The muscle is retracted on both sides and the fat can be visualized and suctioned either open sky or even removed surgically.

Periorbital Surgical Treatment in Blepharoplasty

In performing a blepharoplasty, the treatment of the surrounding tissues is sometimes of importance, and if not accomplished at the original surgery, it becomes more obvious and necessary after blepharoplasty **(Figures 21-28 to 21-30)**. Aging of the eyelids involves the lid skin in addition to the junction of the cheek skin and some

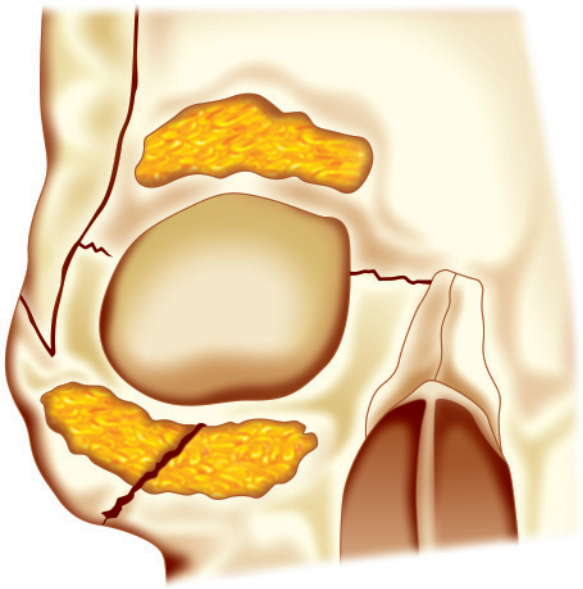


FIGURE 21-28
Superior (retro-orbicularis oculus fat) and inferior (sub-orbicularis oculus fat) periorbital fat pads

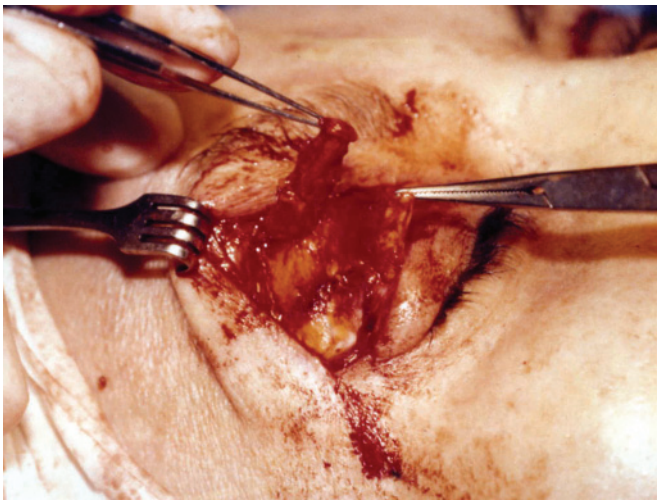
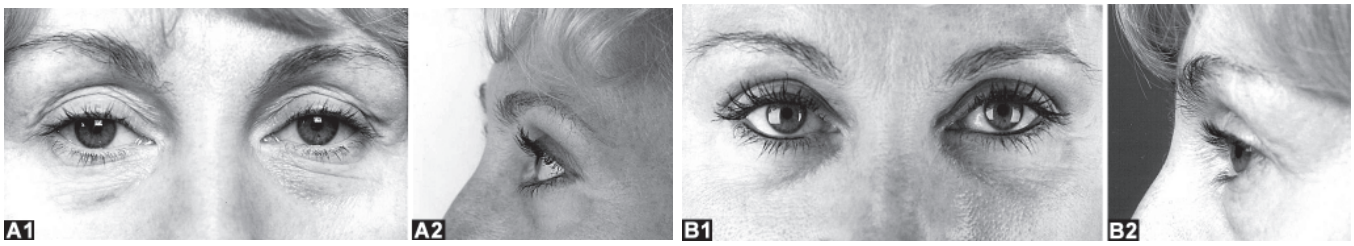


FIGURE 21-29
Forceps holding the supraorbital fat cushion (at the supraorbital rim) while the hemostat holds the central orbital fat pad (in the orbit)

eyebrow relaxation and ptosis. Above the upper lid, the tissues consist of brow and soft tissue under it. The brow itself descends and its ptosis is facilitated by the supraorbital fat which cushions it under the orbicularis muscle. This fat cushion is soft and its bulk and looseness allows the eyebrow skin to move downward. The treatment of brow elevation with buried sutures and fat removal can be performed to improve this ROOF fat pad. Only by removing this fat cushion, the position of the brow can improve and stay more stable.



FIGURES 21-30A AND B

(A) Preoperative 43-year-old female with supraorbital fat deposits. (B) Postoperative following fat excision from the brow area

At the level of the lower lids, the lid skin is often redundant and relaxed and often associated with the "eyelid jowls" present in the form of festoons, malar bags, or even as the over-protrusion of the SOOF. The malar bag and festoons can be corrected by different techniques. The SOOF itself is an excess fat which is situated under the orbicularis muscle and over the periosteum of the malar area. Its suction or elevation during face-lifting can improve the situation.

Anatomy

At the level of the orbital rim and above it, the fat cushions are situated below the orbicularis muscle. They are apparently more developed in the male in view of the configuration of the supra-orbital area which exhibits a concavity above the orbital ridges. The frontal bones are covered by the fat pad which is crossed by the supraorbital nerve and artery.

At the level of the lower orbital border, the fat cushion is situated below the rim and occupies a space above the periosteum and below the orbicularis muscle. This pad is caused by the inferior orbital nerve.

Technique

Once the skin and fat pad extraction has been performed on the upper lids, the fascia orbitale is split horizontally along the whole length of the incision. The upper lid flap containing the upper lid, the eyebrow and the orbicularis muscle is elevated from the plane below by sharp and blunt dissection. The fat pad consisting of the ROOF is then identified, and it is dissected from the periosteum below it up to the level of an ophthalmic vein crossing the supraorbital area. It can be excised completely or partially to improve on its appearance. Fine liposuction is rarely advisable in such cases, although not altogether contraindicated.

At the level of the lower lid, the dissection is performed by elevating the skin muscle flap from the septum orbitale below, and after visualizing the orbital rim, dissection is continued below the rim, elevating the orbicularis muscle with the skin for approximately 2 cm. At this point, the fat pad is grasped from the superior area and once it has been freed above from the orbicularis muscle, it is freed from below freeing it from the periosteum avoiding the infraorbital nerve zone. This fat extracted represents the SOOF or a gliding tissue necessary for lid movement. After hemostasis is secured, the skin is draped and a suspension of the SOOF and orbicularis muscle to a higher position over the periosteum of the orbital border can be performed; thus elevating the mid face. This type of surgery has been developed by many surgeons including Hester, Vasconez and Shorr for correction of the short lid and for elevation of the SOOF to a better position. In less common cases, the SOOF can be suctioned by any approach (face-lift, blepharoplasty, intraoral or direct cutaneous approach).

Discussion

The surgical approaches in the esthetic improvement of the orbital ridge area are procedures that have developed recently and are necessary in surgical blepharoplasty technique. Complications consist of numbness in the eyebrow area, sometimes increased wrinkling of the lower skin, and ecchymosis and hematomas; however, they are very useful in the treatment of the periorbital esthetic improvement of the face.

Melolabial Fat

This area remains the most difficult to treat.

Previous attempts consisted of direct excision of the melolabial area leaving a large scar to replace the nasolabial deep fold. Others tried to undermine the skin and fill the groove only to see hypertrophy of the area and thickening of the melolabial prominence. Suction treatment often ends up in distortion and adhesion secondary to uneven suction and poor draping of the skin.

Incisions

- Intranasal in the vestibule allows the suction to be done in a fan shape on either side of the nasolabial fold.
- At the lower end of the nasolabial fold, this is a direct approach allowing suction of the melolabial prominence.
- Distant approaches from the chin incision are very difficult. The preauricular incision during a face-lift which is the easiest, however, a large flap undermining is necessary to reach this melolabial zone and then after elevation, either liposuction of the zone or direct excision of the fat is done as described by Millard.

Anatomy

The melolabial hypertrophy situated lateral to the nasolabial fold becomes prominent in the early stage of aging and weight gain. It becomes a difficult area especially for men who have an over-developed melolabial redundancy associated with deep nasolabial folds. It is due to the redundancy of the cheek skin blocked at the nasolabial line by the skin adherence to the zone of junction of the orbicularis muscle with the zygomaticus muscle and levator labii muscles. This zone contracts during smiling; however, the distension of the skin with age makes it redundant and the fold ends-up as an anterior chin jowl similar to the jowl situated in front of Furnas ligament in the chin.

Caveats

Patients should be warned about the fact that this area is difficult to improve completely and that it is a combination of fatty excess and skin redundancy. In addition, emphasis should be placed on the fact that suction alone will sometimes actually worsen the appearance of skin excess ending-up in overhanging skin in the melolabial zone over the nasolabial fold. Other techniques are helpful for solving this problem, as mentioned above.

Technique

Under local anesthesia, the melolabial zone can be approached through any incision as mentioned above, and it can be approached from above the nasal crease or below the lower end of the nasolabial fold or from a nostril. The suction is performed with a small cannula palpating the skin in an area that is thinned out and controlled with the pinch which should ideally measure between 2 mm and 4 mm. Compression bandages are helpful in the early postoperative period.

The combination of technique with face-lifting usually is a better combination and improves the problem of skin excess in addition to the melolabial redundancy which is actually not an excess of fat but mainly a doubling of the fat while the skin is folding. Techniques consisting of the direct excision of the nasolabial fold with an ellipse around. It is less popular and although it results in a fairly acceptable result, they leave a long scar that is objectionable to some people.

Jowls

The jowls consist of a redundancy of the lower chin skin which is folding due to its relaxation thus doubling the thickness of the fat situated under it. This folding is blocked by Furnas ligament situated from the skin down to the chin area. Furnas ligament's blockage determines the actual jowl which then can be corrected in different ways.

One way to correct it during face-lifting consists of complete undermining of the area liberating the skin at the level of Furnas ligament and elevating it and tightening it over the buccal muscles. A second technique consists of a simple liposuction of the area, which sometimes is less than successful, since the skin will not drape comfortably over an area that has been de-fatted and will then create adhesions to the muscles below. It has been found that excess suction in this zone can leave deep furrows which are objectionable.

An isolated case of jowls liposuction can be performed using small cannulas; however, the same problems can result from the removal of the fat and the adhesions secondary to the removal. These adhesions will occur between the skin, which is redundant, and the muscles below, which are moving, and in view of their contraction, will worsen the look of the area. It is for this reason that the choice is mainly of performing either a meloplasty with jowl suction or a complete facial suction with bypassing of Furnas ligament to liberate the skin and allow it to contract more evenly.

22 Facial Liposuction Combined with Rhytidoplasty

Adrien E Aiache

ABSTRACT

Prior to the use of liposuction, the results of face-lifting procedures were often unsatisfactory especially in the areas of the jowls and under the neck as well as for the nasolabial folds. Liposuction has been of tremendous help in contouring the neck, the angle of the mandible, the nasolabial fold and the cheeks. The liposuction technique is useful in complementing the face-lift technique. It improves the appearance of the face, improves in the removal of the unwanted fat and improves in the overall appearance of the face. Excess bruising, hematomas, rare cases of nerve paresis, infections and skin slough are possible complications. New problems occur as new approaches and applications of the technique are developed especially the new techniques of ultrasound and others.

Introduction

Prior to the use of liposuction, the results of face-lift procedures were often unsatisfactory especially in the areas of the jowls and under the neck as well as for the nasolabial folds.

To be more specific, there were problems associated with the redundancy of the jowls, the recalcitrant nasolabial folds, and especially the fat of the neck which was contributing to the "turkey-gobbler" deformity. These problems were treated by direct excision of the fat producing problems such as bleeding, adhesions, and deformities secondary to the unequal excision of the fat a technique which was producing problems such as bleeding, adhesions, etc. In some cases where obesity was associated with facial skin redundancy and droopiness, it was especially difficult to obtain good results and the patients were always disappointed. The obese patient was often rejected as a candidate for face-lift and some of the patients with excess nasolabial folds or jowls were particularly unhappy with the results.

In order to improve the appearance of the face in the face-lifting procedure, liposuction has been of tremendous help, helping in contouring the neck, the angle of the mandible and the nasolabial fold as well as the cheeks which can be carved. This technique does not increase the morbidity of the face-lift procedure and does not increase the scarring.

Marking

The patients are marked either in the sitting or standing position. The standing position is helpful in appreciating the amount of nasolabial redundancy, the jowls and the neck fattiness, and over-protrusion. The incisions are marked in the temple, in front of the ear in a lazy-S fashion going behind the tragus, around the earlobe and the posterior mastoid area. The markings for undermining are made as usual. The malar area is marked so that the

liposuction is avoided in that zone unless it is requested by the patient. The marking with ink is made as a triangle, based laterally on the cheeks going toward the apex to the nasolabial folds and along the nasolabial line into the neck. These are the liposuction zones. In the neck, the markings are made with the incisions in mind for the liposuction, under the chin slightly away from the chin crease to avoid the witch's chin deformity. The markings in the neck go below the chin to the hyoid bone level and laterally above and along the sternocleidomastoid muscle.

Technique

The patient is then in the supine position for surgery. Anesthesia can be general especially in older patients or relatively risky cases or in patients unwilling to undergo local anesthesia. In more courageous patients, under local anesthesia surgery can be done easily. It consists of the usual anesthesia solution.

The surgery starts with incisions in front of the earlobe and under the chin. Through these two incisions, complete liposuction of the chin, mandibular jowl area and laterally in front of the sternocleidomastoid is done using the usual multiple strokes with liposuction using a 4 mm cannula and a 3 mm cannula for finessing. The liposuction is then carried anteriorly from the anterior earlobe incision and liposuction of the cheeks is done up to the malar bone. The cannula goes to the nasolabial fold involving, in addition, the melolabial mound which constitutes the folding of the nasolabial fold blocked in this area. Once the cheeks are satisfactory, completion of the face-lift elevation is performed with the usual preauricular incision and postauricular incision. The undermining up to the midline of the neck, to the nasolabial fold and to the second crease of the neck elevating over the malar area up to the orbital commissure. The skin is lifted and completion of the suction is sometimes done using an "open sky" technique if there is still an excess of fat situated between the skin and the subcutaneous tissue area. At this point, the superficial muscular and aponeurotic system (SMAS) is incised in a hockey-stick fashion, it is elevated and tightened using absorbable sutures then the skin is draped, the excess is marked and excised, and it is closed using absorbable subcuticular sutures.

Elevation of the skin demarcated which is done using Metzenbaum scissors after it has been elevated with the liposuction cannula. Before closure, the jowls and the lower neck are liposuctioned as an open procedure while checking the results of the closed liposuction. The open liposuction is useful in the lateral buccal area which is usually difficult. The undermining and the liposuction over the labiomandibular muscles are done for a complete improvement of that zone **(Figures 22-1 to 22-10)**. It is often noted nowadays in patients who have had a face-lift that this zone has been left without satisfactory removal of the fat, and draping of the skin leaving this unsightly bulge on the lateral aspect of the oral commissure. This combined procedure is useful since it will complete the face-lift surgery.

FIGURE 22-1

The first step consists in liposuction of the cheek and neck. A submental incision of 4 mm and a retroauricular incision of 4 mm is used for the procedure

FIGURE 22-2

Liposuction of the chin and cheeks through a chin incision of 3 mm

FIGURE 22-3
Liposuction of the neck can be extended to the border of the sternocleidomastoid muscle and can go through the jowl area

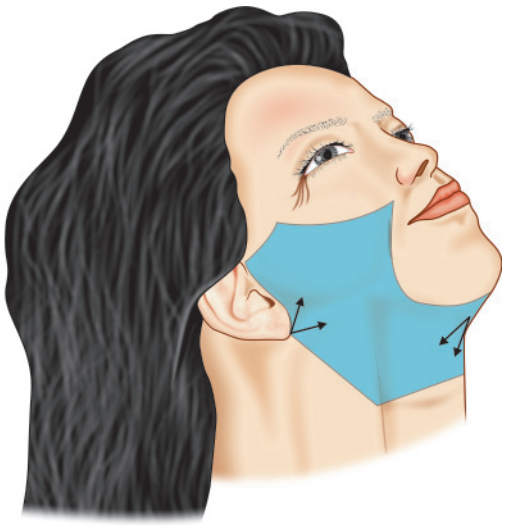


FIGURE 22-4
The first step consists in liposuction of the chin and neck through a 4 mm chin incision. The chin, neck and jowls, as well as the remainder of the face in some case, are liposuctioned through a preauricular incision placed in front of the earlobe

FIGURE 22-5
The combination of the two incisions allows crisscrossing for homogenous removal of the chin, neck and the jowls

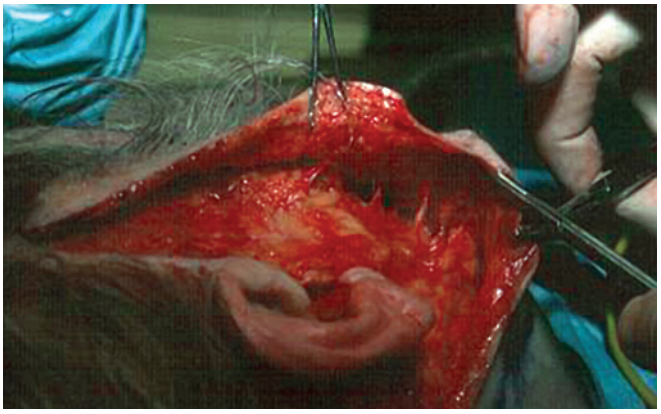


FIGURE 22-6
The second step after liposuction: The face-lift flaps are elevated by blunt and sharp dissection revealing the septa left intact after liposuction and some remaining fat on top of the platysma

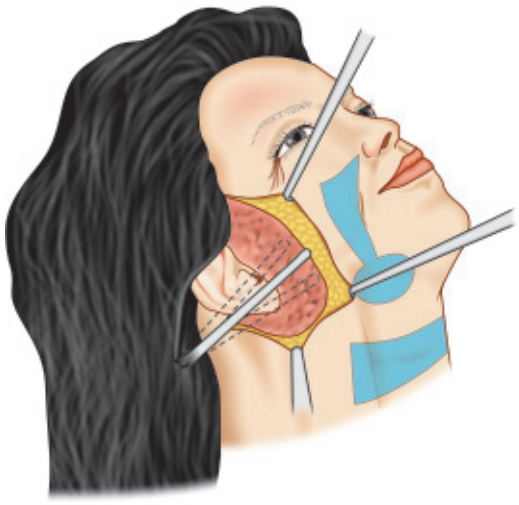


FIGURE 22-7
The third step: "Open sky" liposuction of the chin, neck and jowls as well as the cheeks, the melolabial area and the parabuccal area

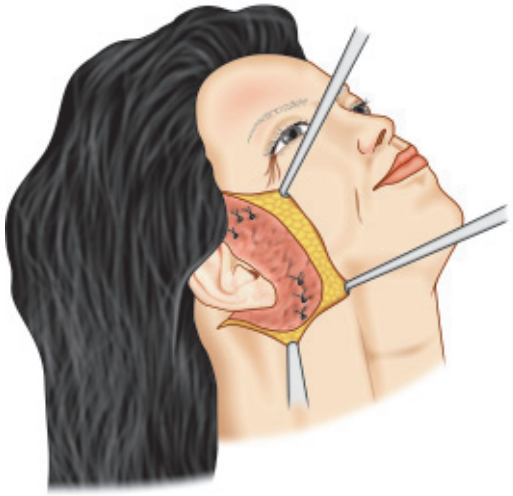


FIGURE 22-8
When indicated, sectioning and plication of the platysma fibers is done. Elevated, and plicated in a hockey-stick type of incision

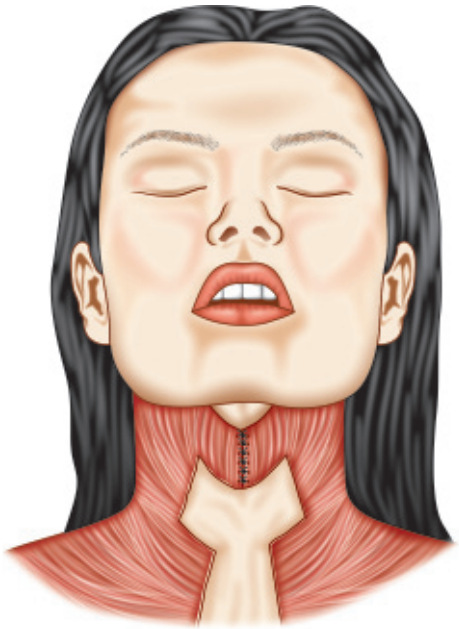


FIGURE 22-9
The medial vertical bands of the platysma muscle are plicated after they have been sectioned at the level of the hyoid bone forming a supporting hammock under the chin

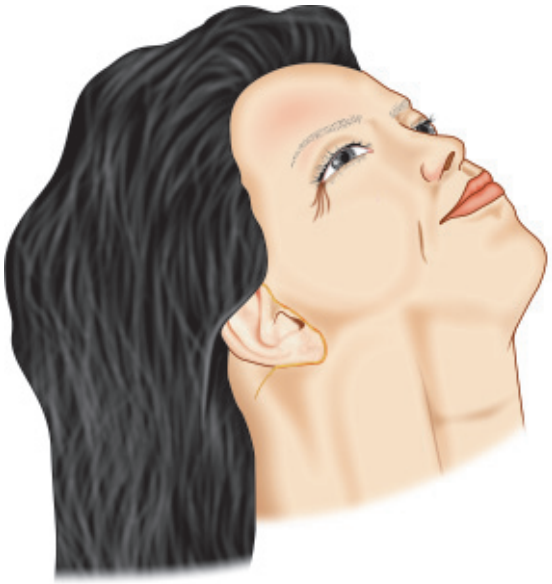


FIGURE 22-10
The fifth step: Closure of the wound is performed over a postauricular Penrose drain

Refinements are performed using a finer cannula especially around the chin incision which often has excess of fat especially around the chin incision when it is associated with the platysma plication. Another step for the refinements, as mentioned, is the peribuccal area. Liposuctioning at the apex of the nasolabial fold and melolabial mound, which often are redundant after the face-lifting procedure and often, if not performed sufficiently, will leave a relatively conspicuous sulcus and melolabial mound. Fine liposuctioning can be performed over the sternocleidomastoid muscle where the fat deposits are relatively less conspicuous but more difficult to treat. Since the SMAS tightening seems to accentuate the protrusion of Bichat's fat, the pocket is opened with a clamp, extruding the fat pad and, by using suction, it gently avulsed from its deep cheek location.

Dressings

The patient is dressed in the usual fashion. No effort is made to drape the skin tightly by Elastoplast since the flap has been elevated for fear of congestion and possible slough of the flap.

Postoperative Care

Patients are discharged and the bandages are removed within 48 hours. A postauricular drain is usually left *in situ* and removed at this time. The patients are treated with prophylactic antibiotics as well as pain medications. In the neck, massages can be useful at a later stage to prevent the adhesions from forming in this combination of techniques. Ecchymoses and hematomas are treated in the same fashion using massages and sometimes even external ultrasound.

Discussion

The liposuction technique is useful in complementing the face-lift technique. It has improved the appearance of the face, improved in the removal of the unwanted fat and in the overall appearance of the face, especially the cheeks **(Figures 22-11 and 22-12)**.

Complications of Facial Liposuction Alone and in Combination with Face-lift (Figures 22-13 to 22-16)

Excess bruising, hematomas and rare cases of nerve paresis when the liposuction cannula inflicts contusions to the mandibular branch of the facial nerve; when the liposuction is performed from under the chin and it is turned around to suction the jowls and the angle of the mandible. Other complications are seen rarely, such as infections and skin slough, although the skin sloughs are usually associated with excess skin removal with excess tension on the flaps.

After the early days of enthusiastic use of the technique of liposuction, its particular problems are surfacing. The problems encountered were the following:

Facial Liposuction Alone

Cases of liposuction are usually reserved for young faces, early aging and chubby faces. Problems have been irregularities and depressions especially in the areas of the jowls where the suction process has been too intensive.

In the neck irregularities and unevenness are often found. In men, alopecia can result from liposuction of

FIGURES 22-11A AND B

(A) Preoperative 56-year-old woman with facial redundancy and fat deposits. (B) One year postoperative after meloplasty, blepharoplasty and neck liposuction

FIGURES 22-12A AND B

A 38-year-old woman with facial redundancy and neck excess

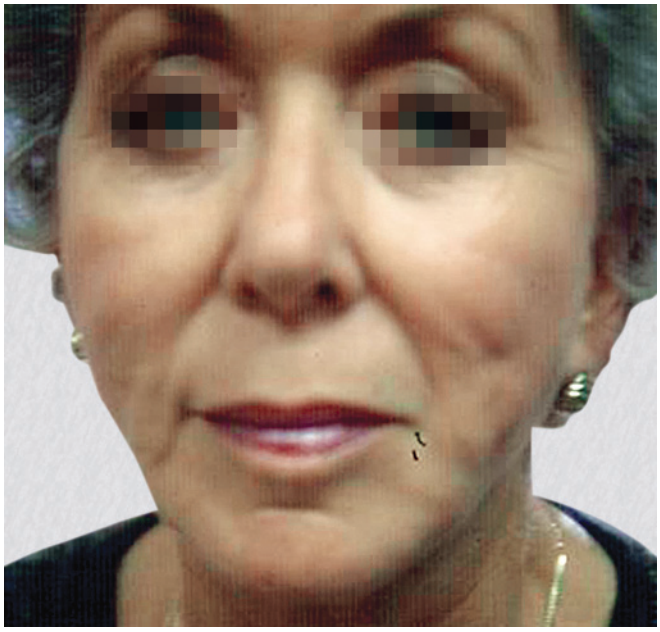


FIGURE 22-13

Skin puckering in the area of the nasolabial and parabuccal folds after liposuction lipectomy on a postoperative face-lifting case. The scar, already present does not respond well to liposuction since the fat is compartmented in the scar

the chin in thin-skinned areas. The most common distressing problem is seen in patients who undergo liposuction of the face in cases done after a previous face-lift has been done. In these cases, adhesions of the skin develop with irregular bumpy scars along the zones of suction. Irregularities, deep wrinkling and distortions have been seen. Although physical therapy with ultrasound has been used, the complications eventually necessitate a second skin undermining and tightening in order to

FIGURES 22-14A AND B

(A) A 66-year-old female shortly after facial suction lipectomy and one year after meloplasty. No skin excision in the second procedure. (B) The treatment eventually consisted of rhytidoplasty with skin excision and tightening

FIGURE 22-15

Neck complications in cases of suction lipectomy performed a second time or after a face-lift. The treatment consist of massage, ultrasound and steroid injections

FIGURES 22-16A TO C

A large hematoma in the chin will have a long protracted course of scarring and disfigurement before improving. It is often a better idea to explore the area with a small chin incision just saving time and torment

improve these adhesions. Bleeding is seen at times and is often very noticeable in the early period of postsurgery but will manifest itself later as an area of hardened lumpy hematoma. Infection is not a common problem.

Nerve Injuries

Rare cases of transient paresis of the corner of the mouth usually follow a vigorous liposuction of the jowls and nasolabial area. This transient paralysis will often disappear in a few weeks. The most common problems are puckering, dents, lumpiness of the skin in the area of the nasolabial fold and peribuccal area. In these cases, the scar seems to be more prevalent especially after cases of face-lifting done in a previous surgery. Treatment by heat massage and ultrasound improves this problem. For depressions, local use of Zyderm and autologous fat has some proven benefit. In these dents and irregularities, if they resist conservative measures, the treatment will have to resort a face-lift procedure with re-undermining of the skin. A common problem is transitory temporary anesthesia of the area which returns in a few weeks. Asymmetry is a common sequelae, and aside from extreme care in performing the liposuction, there are no other measures to prevent these problems.

Conclusion

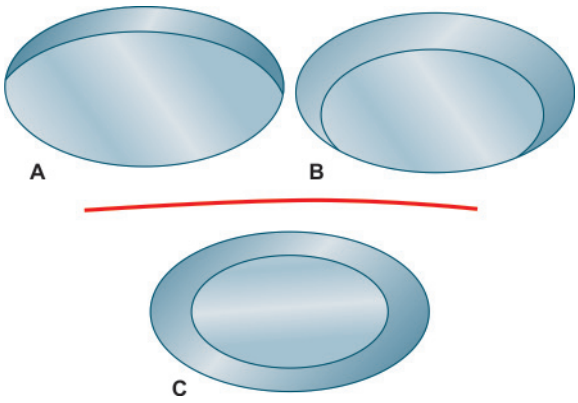
A host of annoying and distressful complications can occur as a result of liposuction techniques. Some of these complications are less seen in experienced hands. On the other hand, new problems occur as new approaches and applications of the technique are developed, especially the new techniques of ultrasound and others.

23 Contour Liposuction

Adrien E Aiache

ABSTRACT

A complete circular thinning of the middle portion of the torso is often a better technique at improving a torso which is a circular structure. This concept called "body contouring" allows patients to obtain drastic improvements in their silhouettes. Patients who present abdominal redundancy associated with poorly marked waists and lack of a lumbar curvature are good candidates. Young athletes and body builders who are getting older can improve the mid trunk area. Obese patients who want abdominal improvement can have this technique although it will not altogether improve the torso since the intra-abdominal organs are overdeveloped in these patients. Contour liposuction has been very gratifying in all types of cases but is less satisfactory in cases of redundant, flabby, flaccid skin.



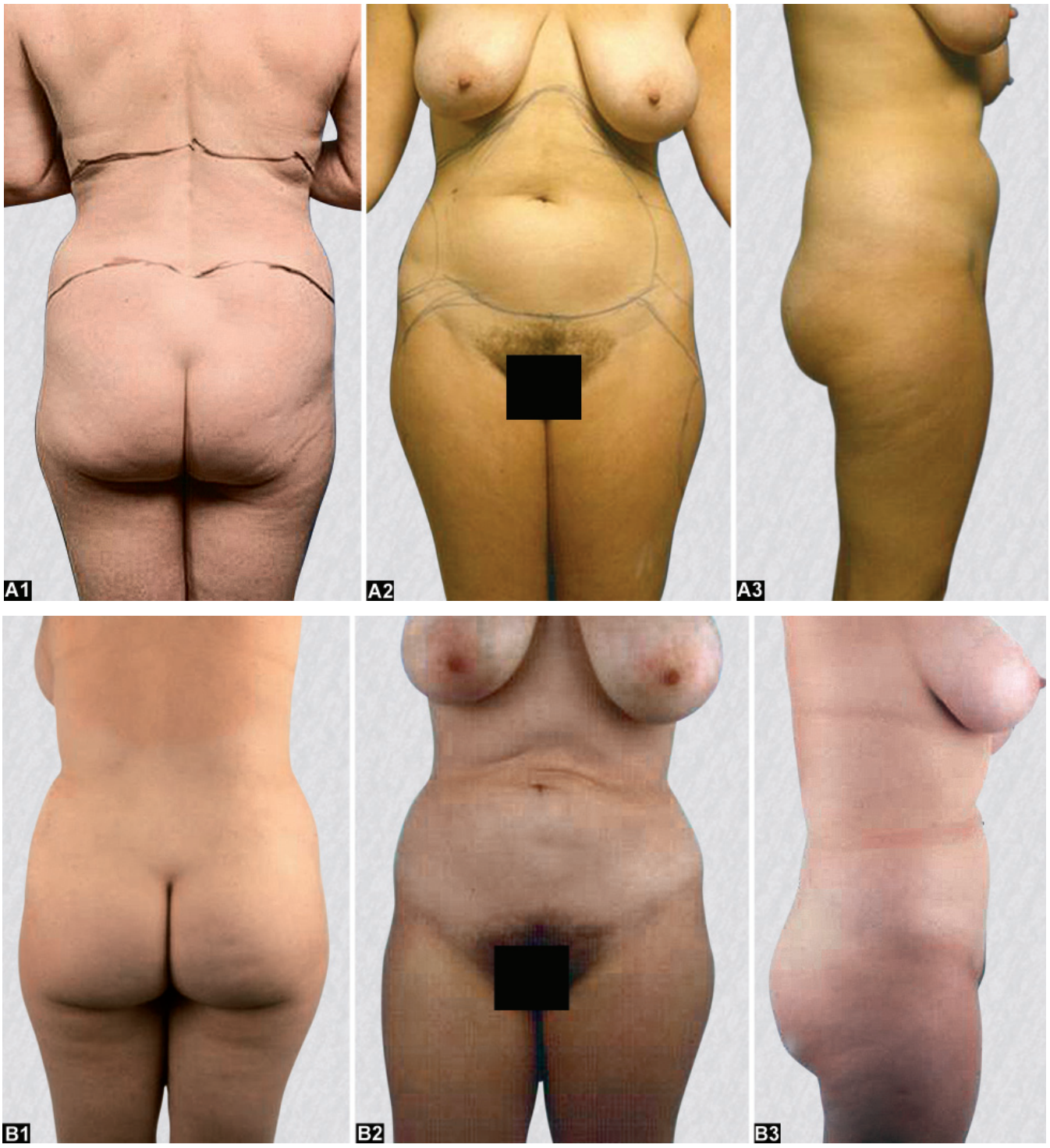
FIGURES 23-1A TO C

Circular suction improves the circumferential aspect of the torso. (A) On the left, shows a slight reduction in circumference if only anterior suction is done; (B) On the right, shows the improved circumferential reduction with waist suction and below; (C) shows the reduction of the circumference when a circular circumferential liposuction is done

Introduction

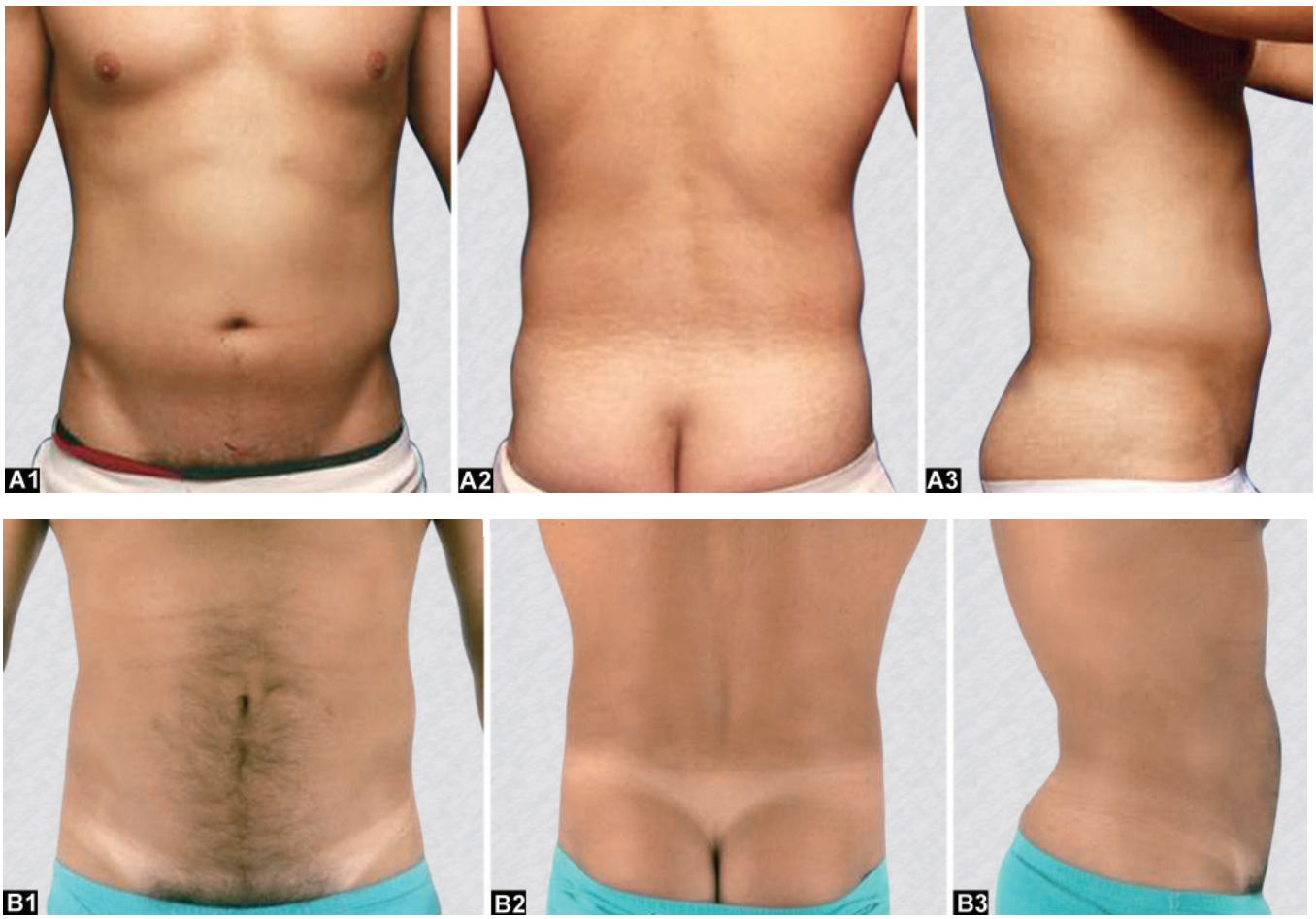
As patients come in for improvement of their abdomen, they often do not realize that it is only a part of a circumference of their body and that often, the waist, needs further reduction in order to improve the overall results. Furthermore, a complete circular thinning of the torso middle portion is often a better technique at improving a torso which is a circular structure. This concept called "body contouring" allows patients to obtain drastic improvements in their silhouettes **(Figures 23-1A to C).**

The surgical techniques for such improvements were developed originally by Gonzalez Ulloa. However, the scars were extremely extensive and visible. These techniques are, nevertheless, still necessary when the skin redundancy is extreme and will not allow proper draping after the suction.



FIGURES 23-2A AND B

(A) Preoperative markings. This encompasses the lumbar area, the waist and the iliac crest as well as the lower part of the rib cage as wells as of the upper and lower abdomen to the waist, and the anterior iliac crest; (B) Three years postoperative after liposuction of the upper and lower abdomen to the waist, the anterior iliac crest waist, lumbar area, and the lower part of the rib cage. Note the improved contour in spite of the fact that this patient gained a few pounds of weight. Saddlebags were also operated on by liposuction



FIGURES 23-3A AND B

(A) Preoperative 28-year-old man, a body-builder showing some heaviness in his lumbar area and waist; (B) Postoperative after liposuction. Note the two paralumbar scars

The contour liposuction is an interesting evolution of the suction which was done in different areas of the torso until it was realized that a complete circumferential liposuction will be most helpful.

Indications

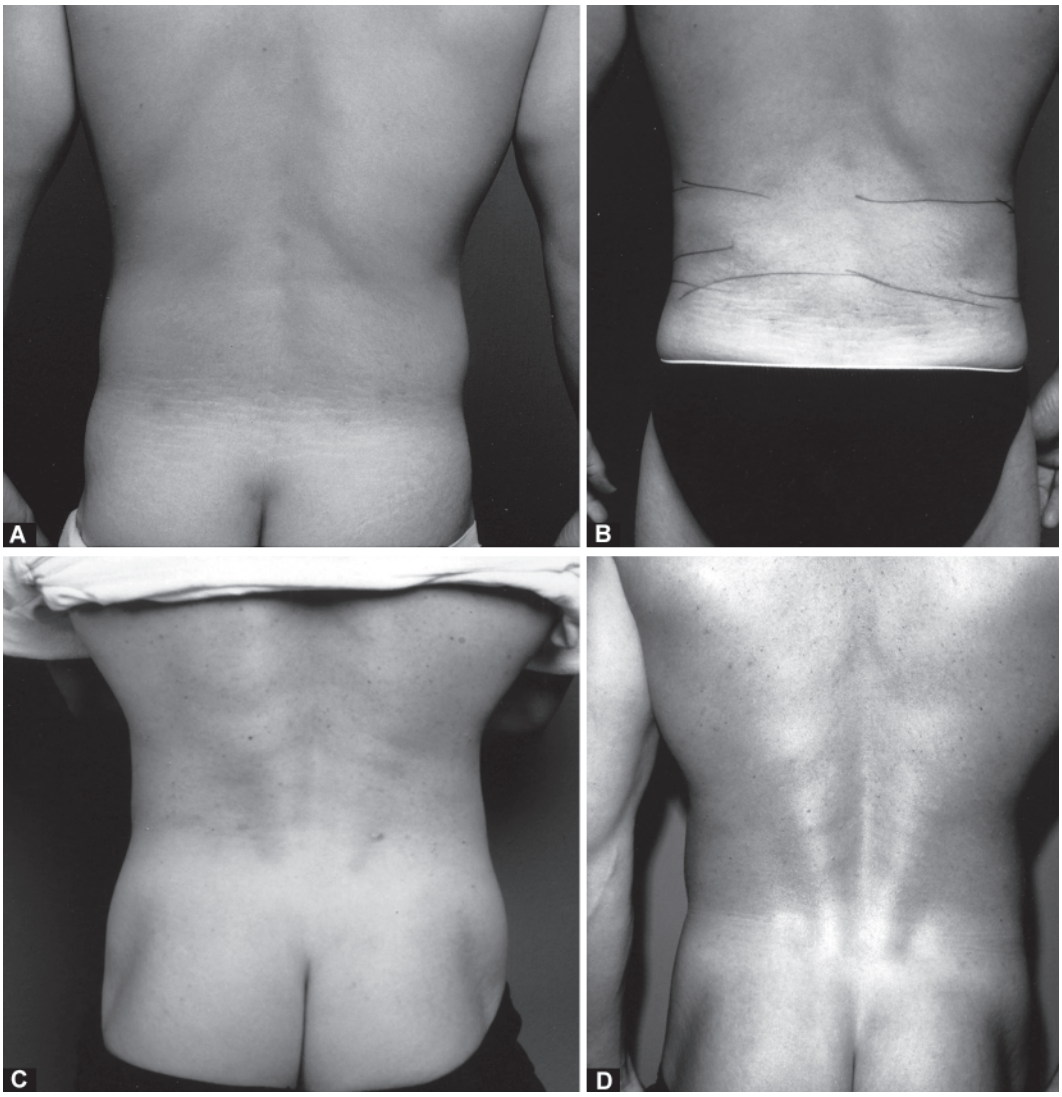
Patients who present abdominal redundancy associated with poorly marked waists and lack of a lumbar curvature will be good candidates. Young athletes and body builders who are getting older will improve the mid trunk area in that fashion. Obese patients, who want an abdominal improvement, can have this technique although it will not altogether improve the torso since the intra-abdominal organs are overdeveloped in these patients. Examination and palpation discover the area of fatty excess in the anterior abdomen, the waist, and in the posterior lumbar area including the lower rib zone and the iliac crests.

Markings and Incisions

After marking the elected areas for suction, the placement of the incisions is made. Two incisions in the parasacral area, one possibly above it in the midline to defatten the posterior rib zone, an umbilical incision as well as a suprapubic incision and a lateral incision at the edge of the rectus are useful for complete contouring. The markings are then made going from the rib cage down to the pubis, over the iliac crest laterally, posteriorly at the level of the ribs or above them, and inferiorly at the level of the iliac crest and the lumbar area. At the periphery, a second marking is made for refinements and feathering.

Anesthesia

General anesthesia is indicated in such an extensive area of liposuction. It is supplemented by the tumescent



FIGURES 23-4A TO D

(A) A 23-year-old man with slight contour lipodystrophy in spite of vigorous physical exercise; (B) Three months postoperative; (C) Preoperative before second surgery; (D) Postoperative after secondary liposuction

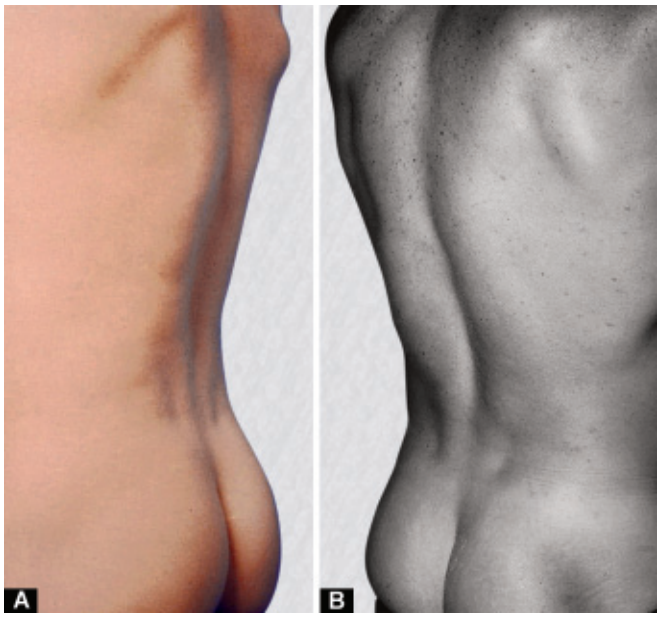
technique. In addition, it is often a zone of potential improvement with ultrasound since the lateral waist area has been very difficult to correct with pure liposuction.

Technique

The patient is placed in the prone position. Through two lateral lumbar incisions and possibly a central thoracic incision using the tumescent anesthesia then the suction cannula, suction is done thoroughly in these zones. Crisscrossing is done using the two different incisions in the opposite direction. Then the patient's wounds are closed with absorbable sutures, bandaged and the patient is turned over in supine position. From that point, the procedure is completed using a procedure similar to the abdominal liposuction and the lateral waist liposuction.

Postoperative Care

After a period of two days of rest, bandages are removed and the patient is placed in a girdle and is allowed proper showering and toilet. Exercises are allowed a week after surgery. Prophylactic antibiotics and pain medications are given.



FIGURES 23-5A AND B

(A) Preoperative, a 28-year-old male showing some heaviness of the lumbar and waist areas; (B) Postoperative after contour liposuctioning

Complications

Hematomas, infections or slough are rare. No general complications such as embolus or pneumonia have been noted. On the other hand, the usual cosmetic problems can be seen as with any type of suction, they consist of irregularities, bumps and lumps, and depressions.

Only by slow, thoughtful and painstaking surgical technique will result gratifying and the rate of complication lessened.

Conclusion

Contour liposuction has been found a useful tool in improving the torso in patients where recently only abdominal liposuction was used. The contour liposuction has been very gratifying in all types of cases—men, women, young adults, athletes, and are only less satisfactory in cases of redundant, flabby, flaccid skin **(Figures 23-2 to 23-5)**.

24 Autologous Fat Reconstruction

Adrien E Aiache

ABSTRACT

Dermatocutaneous fat grafts, fat flaps and isolated fat grafts have been used with limited applications and successes. Fat transfer has been used successfully to fill defects and for esthetic purposes. The liposuction technique allows a large amount of fat to be harvested and to be reimplanted as a filler. There is discussion of donor sites, amounts of fat to be injected, instruments to be used and possible complications. When there is fat resorption, fat injection is sometimes performed after freezing excess fat and storing it or by using a new donor area. The process of fat reinjection has given acceptable results in cases where other treatment was available.

Treatment of Cutaneous Surface Defects by Fat Injections

Since the advent of liposuction, the interest in fat as a tissue filler for contour defects has emerged. In the past, only limited applications have been found for using the properties of fat as a "filler". Dermatocutaneous fat grafts, fat flaps and isolated fat grafts have been used with limited applications and successes.

The liposuction technique allows a large amount of fat to be harvested and to be reimplanted as a filler for areas where defects are present **(Table 24-1)**.

TABLE 24-1

Body contour defects

- Steroid injection sites
- Liposuction depressions
- Abdominal inverted scars
- Young-age or old-age cellulite
- Post-traumatic fat necrosis
- Thin ankles
- Depressed cheeks
- Senile hands

Some attempts have been made to use autologous fat for breast implantation but this technique has been condemned by the American Society of Plastic Surgery since the necrotic fat could become calcified and mimic cancer on mammograms.

Originally the procedure was started by reinjecting fat in cases where during a liposuction a defect was inadvertently created. Then the immediate reinjection of the aspirated fat was performed in the hope of preventing a depression from becoming permanent and the irregularities from being noticed. Furthermore, in cases where the depression was noted after the initial stage of

postoperative swelling and edema, correction by injection of fat can be done either from frozen fat or from a new area as a donor **(Figure 24-1)**.

Indications for this technique have enlarged to zones of contour defects either congenital or traumatic such as cases of fat depression due to accidents where the fat necrosis is a result of a deep contusion and destruction of fat **(Figures 24-1 to 24-4)**.

Other areas for fat implants are the deep furrows present in aging faces: the frown lines, the nasolabial folds, the peribuccal and even some deep lip furrows are improved by injecting the fat.

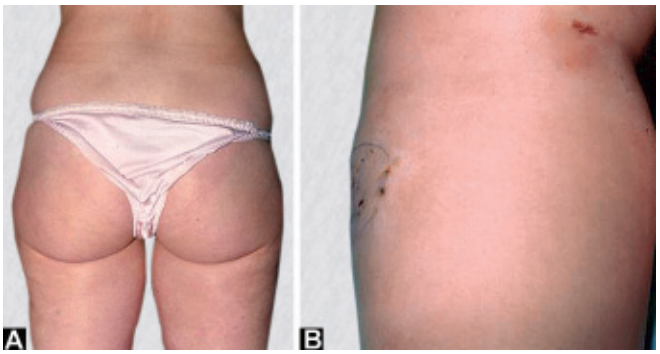
Donor Sites

The location of fat harvesting is elected **(Table 24-2)**. The iliac crest area the flank, the knees, the lower buttocks and the inner thighs are often used as well as the abdomen; however, it is important not to create depressions or defects during the harvesting as it can be found in the abdomen.

TABLE 24-2

Fat injection donor sites

Knees	Often bruises, tender
Iliac crests	Less deforming, less painful, inconspicuous
Abdomen	Possible dents and depressions
Saddlebags	Often difficult to obtain the right amount of fat without depressions or irregularities since the fat is deep
Arms	Objectionable bruising
Waist	Ideal on thin people, especially on men
Chin	Sometime useful for immediate reinjection when there is a large amount
Inner thighs	Excellent, soft fat



FIGURES 24-1A AND B

(A) Preoperative slight dent and depression in the left upper thigh secondary to an excessive liposuction in that zone; (B) The area to be corrected is marked-out with ink. The fat has been reinjected without undue tension. Often it is surrounded by areas of fatty excess and the challenge is to equalize the surface properly with a combination of liposuction and autologous fat injection

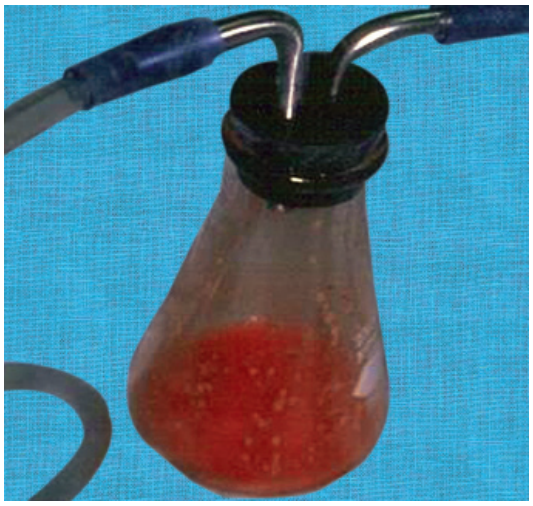
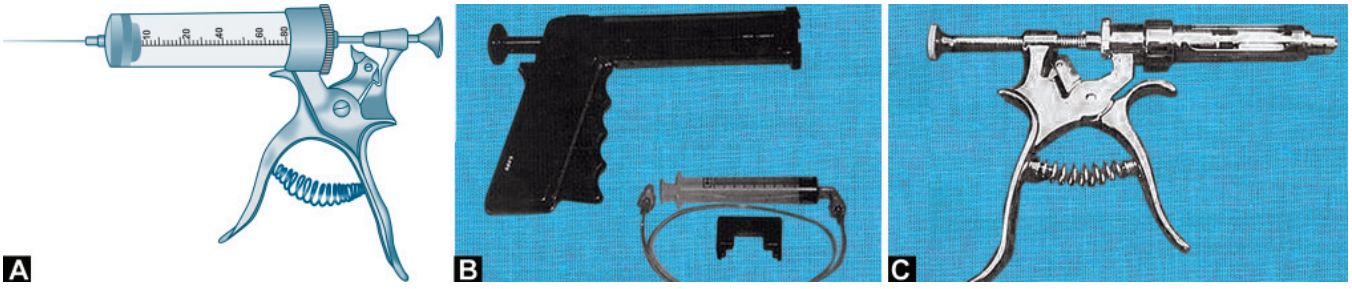


FIGURE 24-2

Different means have been devised to collect the fat while the liposuction process goes on. In this case, the fat is filtered and separated from the blood and is going in a sterile catch basin to be reinjected



FIGURES 24-3A TO C

Different injection guns are available allowing the fat to be injected with power since this has been aspirated with a larger cannula. The fat is otherwise sometimes engulfed in connective tissue and exits the syringe only with a powerful force especially when it has been taken with larger gauge cannula. (A) Chajchir reinjection system; (B) Levine autolipoplasty syringe assist device developed for high pressure injection;. (C) Byron microinjector for pressure injections

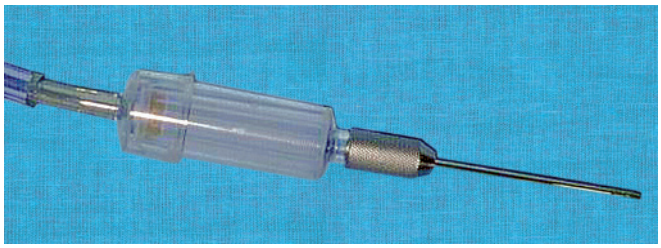


FIGURE 24-4
A trap syringe devised to catch the fat that is aspirated and separated from the blood and the connective tissue

An area surrounding a depression can be liposuctioned and the fat can be used for injecting into the depressed area itself.

Instruments

Cannulas (#4 and #3) are used in the routine liposuction technique and a catch basin collects the fat. The fat is taken in a sterile manner then is cleansed at the time of its implantation either by passing it through a large grill where the large, irregular, thick particles are discarded or by washing it with saline solution. Areas of previous suction are the least satisfactory for donor sites since the fat lobules are connected to multiple strands of connective and scar tissue and are difficult to reinject. It is often better to find a new area to obtain smoother fat **(Figures 24-2 to 24-5)**.

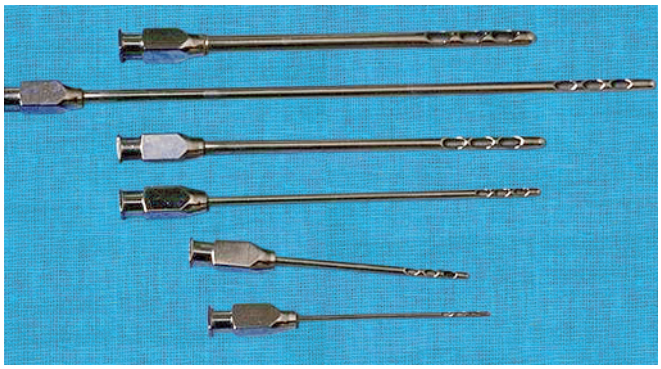


FIGURE 24-5
Different small size cannulas developed for manual syringe aspiration of fat

Technique

The donor sites are infiltrated with an anesthetic solution using, in independent cases, a 10 cc syringe. Anesthesia is given using a 25 or 27 gauge needle. The aspiration technique is started by using the syringe connected to a 14 or 16 gauge needle. Once the needle is introduced under the skin, negative pressure is created manually by pulling back the piston and holding it, and a back and forth motion is performed until the fat slowly accumulates in the syringe. Two to three punctures are sometimes necessary to obtain a good amount of fat from different spots **(Figures 24-6 and 24-7)**. The facial area to be injected is anesthetized. The anesthesia can be similar to dental anesthesia using a solution of xylocaine with epinephrine and infiltrating the supraorbital nerve or the infraorbital nerve and mental nerve from the oral commissure. Then the local anesthesia itself is injected.

FIGURE 24-6
A 14 gauge or 16 gauge needle is inserted in the medial knee area or the left hip using a manual negative pressure. The fat is then withdrawn using back-and-forth motion

FIGURE 24-7
An excellent donor site consists of the iliac crests which has often an excess of fat and where the depression after aspiration will not be conspicuous as it could be in the abdomen

The syringe containing the harvested fat is tilted, separating it by gravity—the blood from the lighter fat. The blood is expelled and the fat injected using multiple parallel channels along the creases. If the blood is too copious and mixed with the fat and does not seem to separate spontaneously, the syringe is then introduced into a centrifuge. Before centrifugation, the syringe should be covered with a blind cap or with a smaller gauge needle in order to prevent the fat from exiting the syringe under pressure while the blood is allowed to separate out. Once the fat is purified and it is visible that there is no other tissue mixed with it, it can then be reinjected in the different areas that have been elected **(Figures 24-8 and 24-9).**

This technique of fat harvesting is modified according to each surgeon's preference. It is logical to utilize the fat that has been extracted by liposuction at the same operative procedure; however, since the discovery of the fat defect is often made at a later stage, the correction by fat injection is sometimes performed by freezing the fat and storing it or by using a new donor area. The preoperative assessment of size of the defect, its relationship to the surrounding tissues and the marking of the deep creases to be created are all done and the deep creases are marked with ink. These markings allow the infiltration with anesthesia and the injection to be done without distortion of the exact line to be repaired **(Figures 24-10 to 24-13)**.

FIGURES 24-8A AND B

The vertical positioning of the syringe allows the fat to float on top and separate from the remaining blood which is then ejected. The blood is liquid and heavier than the fat

FIGURE 24-9

The centrifuge is used for faster separation of the fat from the blood. It can be used only for a few seconds makeing sure that a smaller needle is connected to the syringe for proper ejection of the blood without fat which is heavier and will not go through the small needle gauge

FIGURE 24-10

Markings are made over each of the deep lines present in a typical case of perioral wrinkling. Five to seven inferior buccal lines are also commonly found and infiltrated. In the upper lip, seven to nine vertical lines can be found

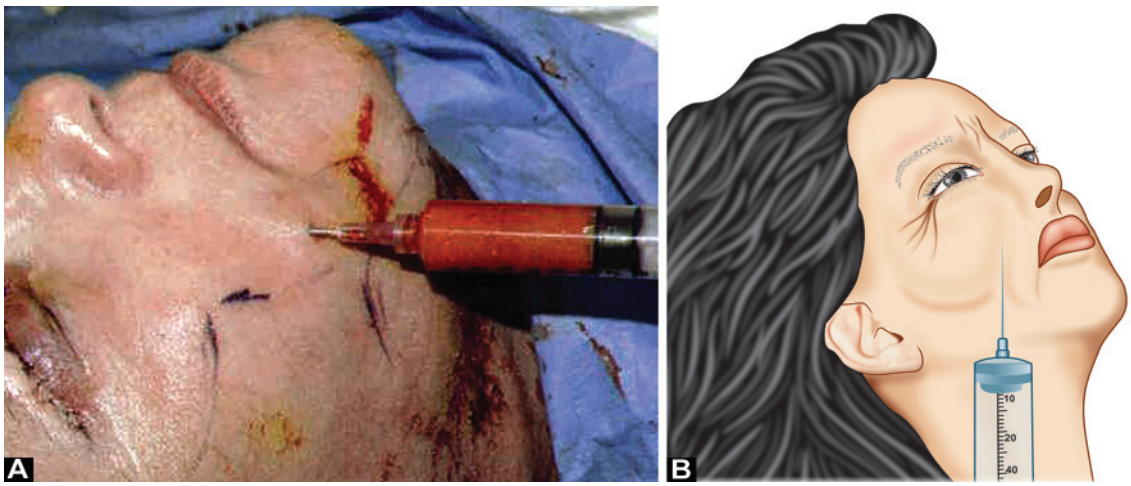
Fat Evaluation (Figures 24-14 to 24-17)

Over=correction is achieved up to a point where it becomes cosmetically unacceptable **(Table 24-3)**. A 16 gauge or 14 gauge needle is used as a dissector to free the dermis from its deeper attachments and to insert a layer of fat in order to prevent the reattachment of the dermis to the deeper tissues. This technique allows the vertical wrinkles of the lip to be somewhat corrected. In

FIGURE 24-11
Precise location and extent of each of the deep lines of the face (frown, nasolabial, marionette and lip lines)

FIGURE 24-12
The nasolabial fold is often approached from its inferior fold where 1–2 cc of fat are injected

FIGURE 24-13
Different lines below the mouth can also be injected with fat. The bulk injection in that area improves the downward droop of the corner of the mouth



FIGURES 24-14A AND B
An alternative site of injection consists of the upper part of the nasolabial fold

FIGURE 24-15

Favored by some surgeons, the site of injection can be intraoral as the anesthesia injection which is done intraorally toward the infraorbital nerve and the mental nerve bilaterally

FIGURE 24-16

Early appearance of a patient who received a fat injection two days before. With proper make-up, the bruising can easily be concealed

TABLE 24-3

Amount of fat injection

Dorsum of the nose	1–2 cc for irregularities, dents, depressions
Acne scars	1/8 to 1/2 cc
Premaxillary	3 cc per area under each nostril
Chin	5–10 cc

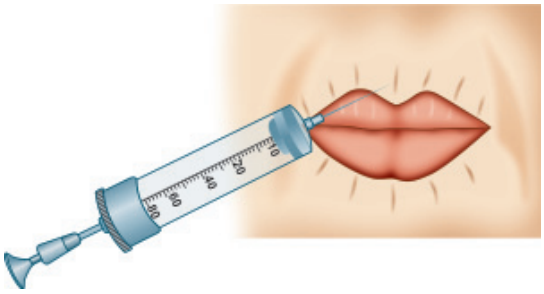


FIGURE 24-17

Fat is deposited along the lip in each deep crease after subcision of the crease is done. Approximately 7 to 9 creases are usually found in the upper lip and 5 to 7 in the lower lip. Subcision consists of a subcuticular undermining with a large bore needle

the nasolabial correction, the infiltration is started from the lowest point of the crease and is continued upward until it reaches the area below the nostril. It could also be performed from the oral mucosa and the line of injection will be perpendicular to the nasolabial line allowing multiple strands of fat to cross the nasolabial line and helping in the correction of the defect. In thin and flat faces, a disk of fat is injected around the nostrils and lateral to it, in order to restore the maxillary projection. From the same lower injection point, a zone below the lip commissure is infiltrated to correct the peribuccal deep creases. These marionette lines are notorious for not keeping the fat and some over=correction and area grafting is necessary to obtain an improvement and to lift the corners of the lips. A test of overfill consists of the spontaneous regression of fat through each injection site.

No specific postoperative care is necessary. The patient is advised to keep the area as immobile as possible and apply some ice during the first 24 hours. No analgesics or antibiotics are given.

It is felt that a period of two days is crucial in the survival of the fat that has been injected. The first hours are usually allowing the fat to survive by osmolality and by osmosis; however, a new circulation is to develop to assure the survival of the fat cells. This specific finding is important in understanding the poor survival of fat which is sometimes blamed as nonsurvival at all.

Results

Since 1986, the author has performed more than 2,000 fat grafts. Of these cases, approximately 50% have received a second injection approximately three months after, and approximately 15% have received a third injection. Only 3–5% of the patients have received more than four injections.

FIGURES 24-18A AND B

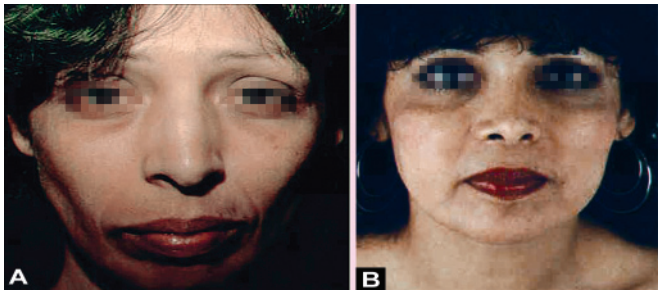
(A) Preoperative 54-year-old woman with facial redundancy and perioral wrinkling with deep nasolabial fold and peribuccal folds; (B) Postoperative result 6 months after facelift and autologous fat transplantation to the nasolabial area, peribuccal zone and lip creases

FIGURES 24-19A AND B

(A) Preoperative 68-year-old woman who had an acceptable result from face-lift but still presented multiple deep lines (frontal, nasolabial, buccal, perioral); (B) Three months postoperative result after injections in the frontal, nasolabial, buccal and perioral wrinkles

FIGURES 24-20A AND B

(A) Preoperative 42-year-old woman with facial redundancy and deep nasolabial lines; (B) Six months postoperative after autologous fat transplantation and one year after complete facial suction without incisions



FIGURES 24-21A AND B

(A) Preoperative 52-year-old woman with facial redundancy and lipodystrophy; (B) Four months post-meloplasty and nasolabial and peribuccal fat transplantation

Approximately 50% of the cases were corrected only once. The natural course of the treatments is the following: After an initial period of swelling and bruising, the treated area returns to a natural stage with some swelling and eventually will return to a normal appearance, which will prompt the patient to request a secondary or tertiary injection. A large number of the patient never had more than one or two injections and have been satisfied with the results **(Figures 24-18 to 24-21)**.

Complications

No severe complications were observed. A couple of areas of redness and cellulitis have been noticed in the knee. Approximately 5–10% of the patients will have a hematoma in the donor site, more often in the knee than the hip, and swelling, ecchymosis and distortion will last 2–6 weeks especially in the perioral area since the injection of fat through a large bore needle can sometimes injure the orbicularis vessels, thus creating large hematomas that take quite a while to disappear.

Discussion

The process of fat reinjection has given acceptable results in cases where other treatment was available. This treatment is used in cases of severe wrinkling where the only treatment consisted of collagen or dermologen injections or surgical excision. The technique has multiple advantages. It is simple and can be performed with needles and syringes, thus not requiring any specific equipment or set-up. It can be performed as a treatment room procedure. It allows the correction of multiple areas of the face and can be repeated until the results are satisfactory. In addition, it has afforded a large improvement in the face-lifting procedure which was wanting in areas such as the frown lines, the nasolabial crease and the peribuccal crease. The procedure is recommended since it has brought a high degree of satisfaction.

25 Non-cosmetic Liposuction

Adrien E Aiache

ABSTRACT

Liposuction has been used to correct deformities in a number of entities. These include lymphedema, fatty tumors (lipomas), flaps and tubed pedicles, nodular multiple lipomatosis, scars and fat depressions that are traumatic or iatrogenic, and in Dercum's disease or adiposis dolorosa (painful lipomatosis). The technique of liposuction is described for each of these disorders.

Introduction

The technique does not offer the same advantages as the fat extraction can offer for lipodystrophy. However, it has been used in some cases and seems to be helpful to a degree. The technique, however, has not replaced other surgical techniques available for the treatment of lymphedema. Some improvements of the condition have been noted and could be attributed to the scar formation after suction preventing the deposits of fluid due to the lymphatic insufficiency.

Fatty Tumors: Lipomas

Although mentioned in some publications, the actual suction of lipomas has been quite frustrating. The tumor consists of well-demarcated, firm fatty globules that do not respond well to the liposuction. Theoretically, it is possible to liposuction lipomas it is rather difficult to accomplish and one often has to complement the liposuction by actual removal of the tumor by dissection with its capsule from the surrounding tissues.

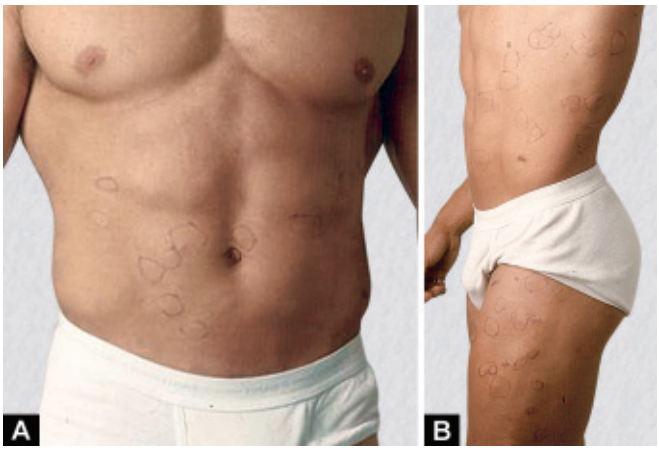
Reconstructive Flaps and Pedicles

Liposuction has been useful in defatting tube pedicles and flaps created for reconstruction. An abdominal tube pedicle and abdominal flap as well as flaps created for repair of decubiti or limb injuries can often be bulky and really lend themselves to sculpturing and tailoring by liposuction.

The technique is used after complete insertion and survival of the flap; if it is accomplished too early, this could jeopardize the vascularization of a newly created flap or tube pedicle. It has been a useful adjuvant in sculpturing the actual transfers and obtaining a better cosmetic result to these flap transfers and recovered areas.

Nodular Multiple Lipomatosis

Cases of multiple lipomas are distressing to patients. In the past, only a multiple excision treatment with multiple scars resulting was the only solution available. These scars were often too disturbing and too noticeable for those patients who were less anxious to have surgery done. Liposuction has proven helpful for treating such patients **(Figure 25-1)**.



FIGURES 25-1A AND B

A 27-year-old man with multiple congenital lipomas. Note the numerous circles drawn around each of the lipomas that are felt only with the pinch test. These were treated by 16 gauge syringe liposuction under local anesthesia

Technique

Each of the lipomas is marked carefully with circular markings with the help of the patient because it is often easier to feel the tumors with the fingers than to visualize them. An average of 20–30 lipomas can be marked with a circle around each of them. The patient is then prepped and draped in the routine fashion, and premedications given. Each of these areas is infiltrated with a diluted solution of xylocaine with epinephrine. Some time is allowed to elapse so the swelling will be less disturbing when checking the exact location of the tumor. Once the tumor is felt by both pinch techniques, roll the tumor between the index and thumb, it is then grasped with the pinch of the left hand while the right hand uses a 14 G needle connected to a syringe and aspiration is performed into it.

This type of surgery is demonstrative of syringe liposuction since it is easier to use for proper control of each of the lipomatous tumor excisions. The 10 cc syringe which has been kept with negative pressure and connected to a 14 G needle is inserted approximately 3/4 of an inch from the tumor itself. By careful multiple puncture of the tumor area, fat is removed. Progressing, one at a time, multiple extractions of these tumors can be performed.

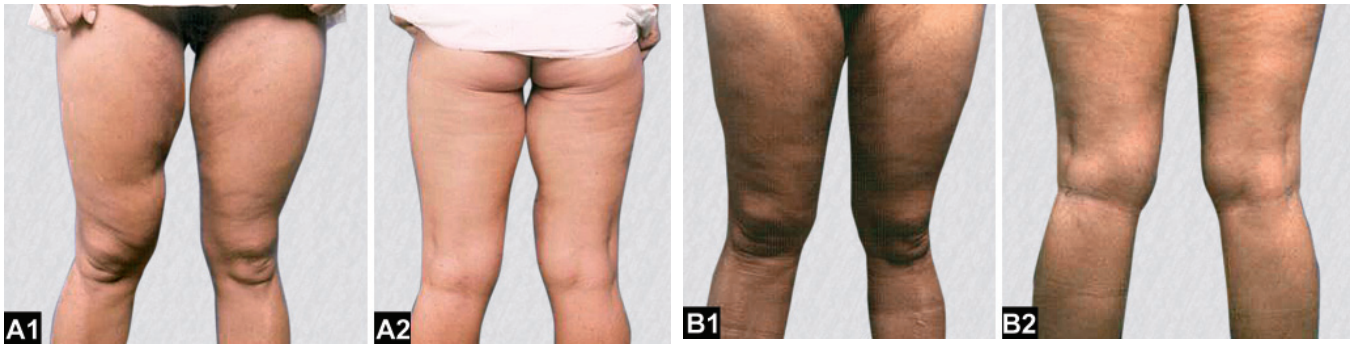
Traumatic and Iatrogenic Scars and Depressions

The treatment of depressed areas consists of a combination of liposuction and fat reinjection in order to re-establish a normal contour. The entry for suction is usually located in an area already scarred and deformed. An incidental fact connected to this new field has been the new understanding of some problems which have been missed in the past such as body depressions and bumpiness **(Figures 25-2 and 25-3)**.

Closed trauma with concomitant fat destruction by devascularization is still not understood by many physicians who are confronted by such problems and do not realize the significance of the lack of vascularization in the fat necrosis.

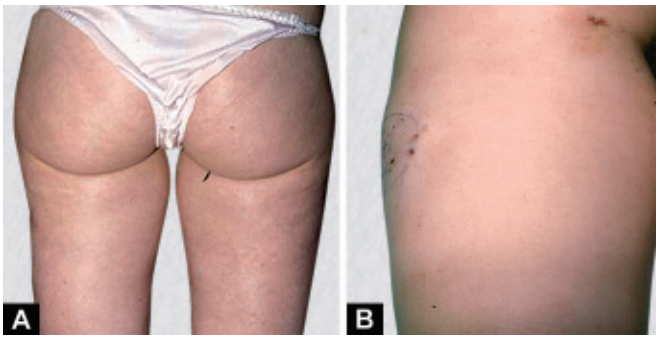
Liposuction in Dercum's Disease

Dercum's disease or adiposis dolorosa, which was described in 1888,[1,2] is a disease characterized by painful adipose tissue in overweight middle-aged woman. The cause of the disease to that date is unknown and the diagnosis is only a clinical diagnosis.



FIGURES 25-2A AND B

(A) Preoperative 27-year-old woman with left inner thigh deformity secondary to a car accident and a severe contusion to the thigh resulting in fat necrosis; (B) Six months postoperative result after liposuction around the defect and autologous fat injection



FIGURES 25-3A AND B

Post-traumatic severe contusion of the hip with fat necrosis and a resulting depression. The donor area has been marked in order to remove the protruding fat and reinjected it into the neighboring depression

Liposuction is used in the whole area of the painful fatty deposits. The suction has shown that it apparently decreases the pain and although long-term results have not been yet established, the effect of the suction seems to be stable. Later work by Brorson et al.[3] has shown that the decrease of pain is apparently a constant effect of liposuction.

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26 Combination of Liposuction and Body Implants

Adrien E Aiache

ABSTRACT

The technique of body implants is often confronted by deformity of the body parts that is due to a lack of muscle definition as well as an excess of fat in an unwanted zone. Such is the case in buttocks with lower fat deposits, and a fat and flat chest wall. There are discussions of buttock, pectoral and calf implants with liposuction, and chin, malar and mandibular angle implants with liposuction. The problems with each are outlined.

Body Shaping with Implants

The possibilities afforded by implants have shown that some patients can be improved in their contour by a combination of augmentation and reduction by liposuction allowing real "sculpture" of the body. Such cases are breasts implants, pectoral implants, calf implants, buttock implants, deltoid implants, forearms implants, malar and chin implants as well as mandibular implants. All of these cases can be associated with liposuction to improve their contour in addition to augmentation by autologous fat injection.

Pectoral Implants

The technique of pectoral implants is evolving slowly. Although it is a difficult and delicate area it can give excellent results to patients interested in improving the shape of their chest wall. However, it is found that some disfiguring factors may be present in addition to the defect of pectoralis muscle underdevelopment. In particular, some patients exhibit gynecomastia and chest fatty excesses associated with their problem consisting of pectoralis muscle underdevelopment.

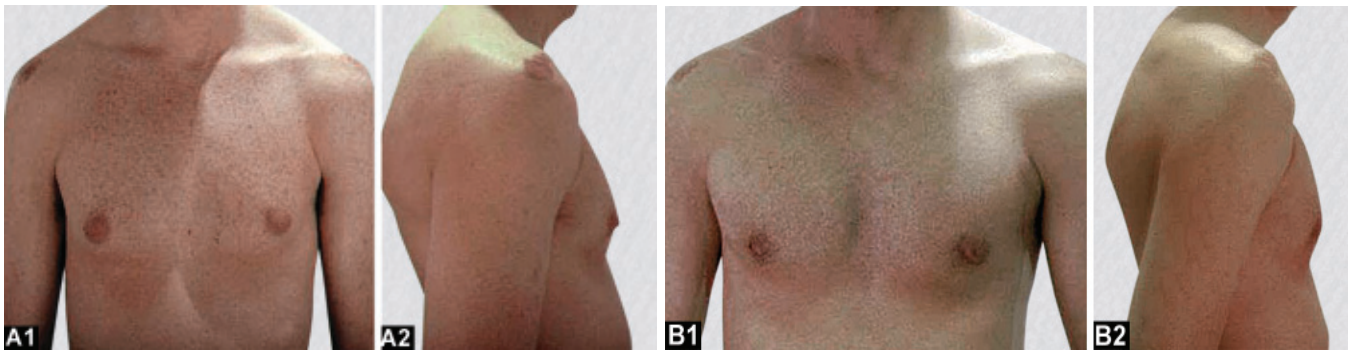
In these cases the treatment consists of excision of the breast glandular tissue responsible for the chest deformity followed by liposuction of the surrounding tissues around the gland, if present, and then followed by submuscular implantation of pectoral implants designed to improve the muscular appearance of their chest. In some cases it could be associated with liposuction of the pectoral area below the implants **(Figures 26-1 and 26-2)**.

Associated Liposuction with Implants

In the technique of body implants, one is often confronted by deformity of the body parts which is often due to a lack of muscle definition as well as an excess of fat in an unwanted zone. Such is the case in buttocks with lower fat deposits, and a fat and flat chest wall.

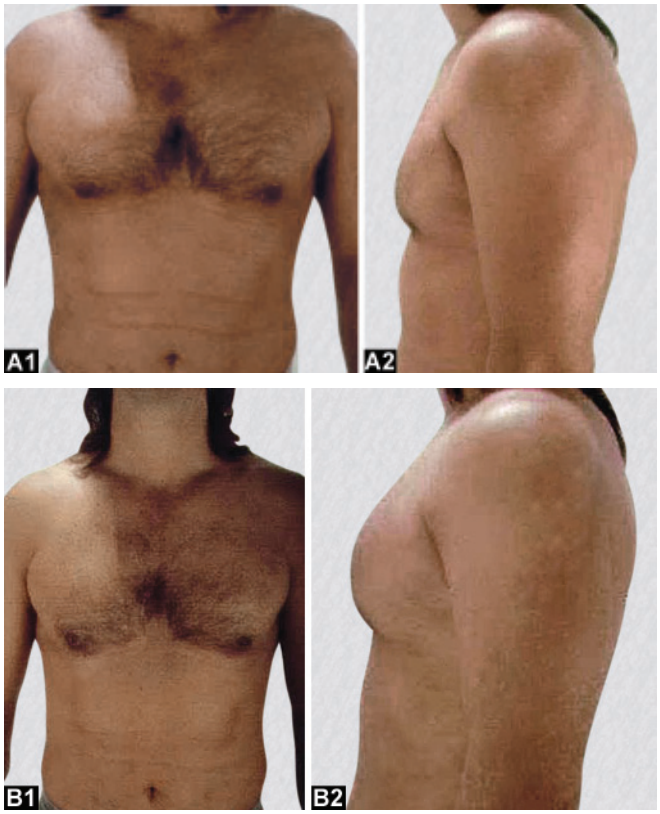
The combination of implants and liposuction improves appearance of the parts. In the chest, the liposuction can involve the lower chest area and axilla.

In calf implants, a real sculpturing is necessary to shape the legs. Suction is accomplished through the incisions for calf implants and from below.



FIGURES 26-1A AND B

(A) Preoperative 27-year-old man with pectoral underdevelopment and fatty chest after gynecomastia surgery; (B) Postoperative result after pectoral implants, and lower chest and axilla liposuction



FIGURES 26-2A AND B

(A) Preoperative 29-year-old man with bilateral pectoral underdevelopment and redundancy of the chest; (B) Postoperative result after pectoral implants and inferior chest liposuction

Buttock Implantation

The technique of buttock implantation has helped in shaping the buttock areas on patients who have an underdevelopment associated with poor posture. In these cases, the technique consists of using liposuction through

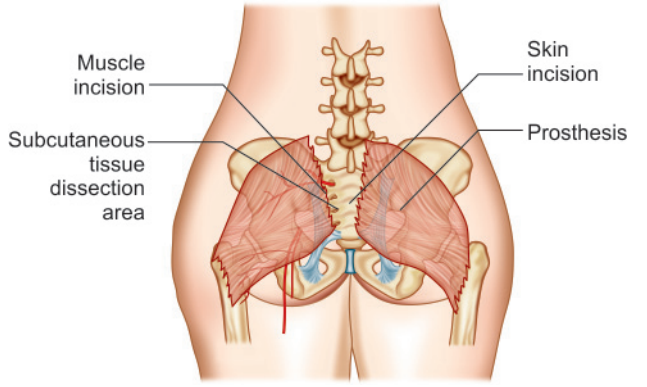


FIGURE 26-3

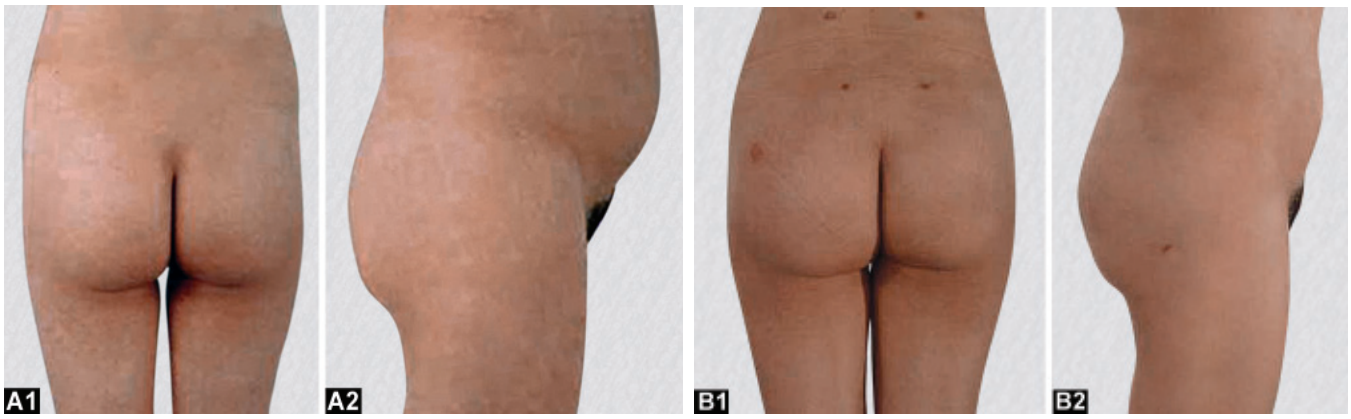
Buttock implants: Incisions and placement of implants

an infragluteal fold or a lateral buttock fold removing the excess fatty tissues situated in lower portion of the buttock. The buttock implantation consists of a solid soft buttock implant positioned under the gluteus major muscle through a central sacral cleft incision. In these cases, care is taken not to compress area of the sciatic nerve emerging just below pyriformis muscle situated under the gluteus major muscle and at the level below gluteus medius. In these cases, since the implantation cannot be low enough for proper contour due to the anatomic elements mentioned above, the addition of lower buttock liposuction is helpful in determining a better shape to the buttock **(Figures 26-3 to 26-5)**.

During the buttock implantation, lower part is not elevated due to the high submuscular position, thus showing an excess of fat in the inferior gluteal zone. Liposuction will correct this unhappy appearance.

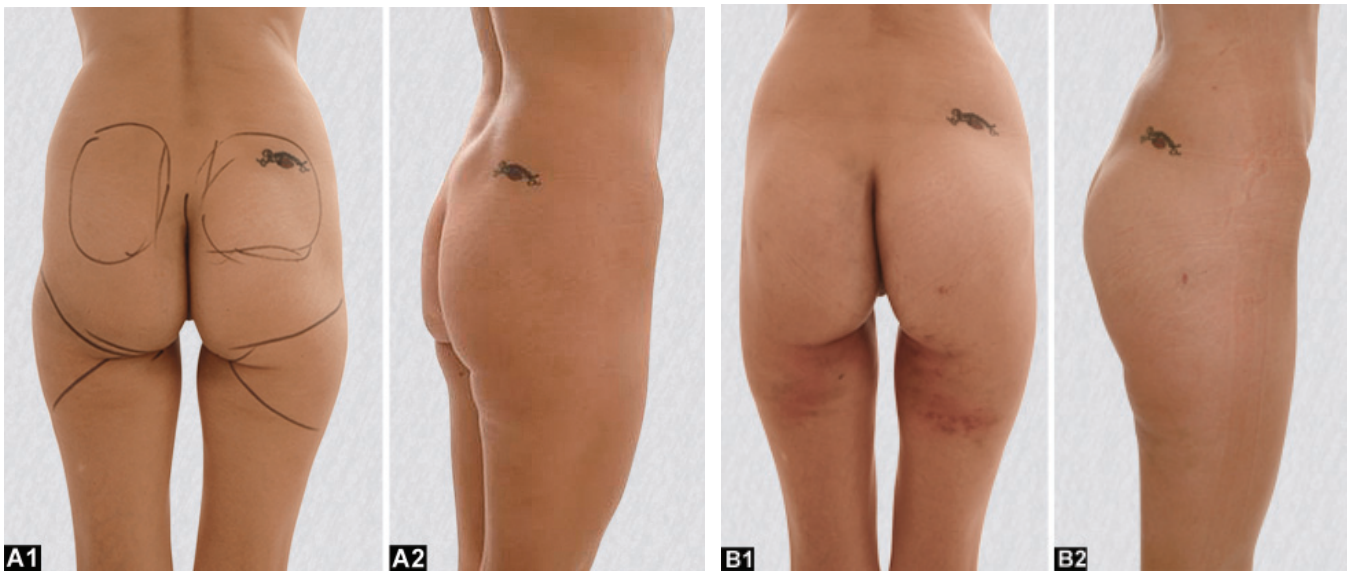
Calf Implantation

In cases of deformities of the leg consisting of underdevelopment of the muscular elements in the calf



FIGURES 26-4A AND B

(A) Preoperative female with underdeveloped buttocks; (B) Postoperative result after liposuction and buttock implants



FIGURES 26-5A AND B

(A) Preoperative female with poorly developed buttocks; (B) Postoperative following liposuction and implants

associated with excess fatty deposits around lower thighs, knees and upper leg, a combination of calf implants with liposuction of knees, the lower thighs and the upper calves is necessary. Some patients will necessitate an inferior leg liposuction sculpturing the ankles and areas below the gastrocnemius muscle, followed by subfascial implantation of the calf implant. This combination of techniques is used in conjunction during the same operation **(Figures 26-6 to 26-9)**.

Technique

The technique of knee liposuction or calf liposuction is only secondary to the technique of implantation since the implantation itself is a procedure necessitating more rigorous asepsis, and the author favors the preliminary implantation of the calf implants and a closure of layers of the fascia and subcutaneous tissue followed then by liposuction of knees and the calves. This combined approach has given more security in the attempt at reducing the potential problems of infection.

The calves are marked in the usual manner for implantation, and the incision for the calf is used as in the regular calf implantation shown in the following chapter. Following this implantation the incisions for liposuction are performed in the lateral and medial aspect of the posterior popliteal incision for implantation and in

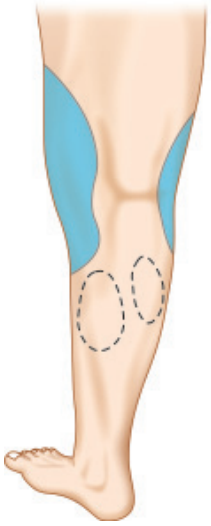
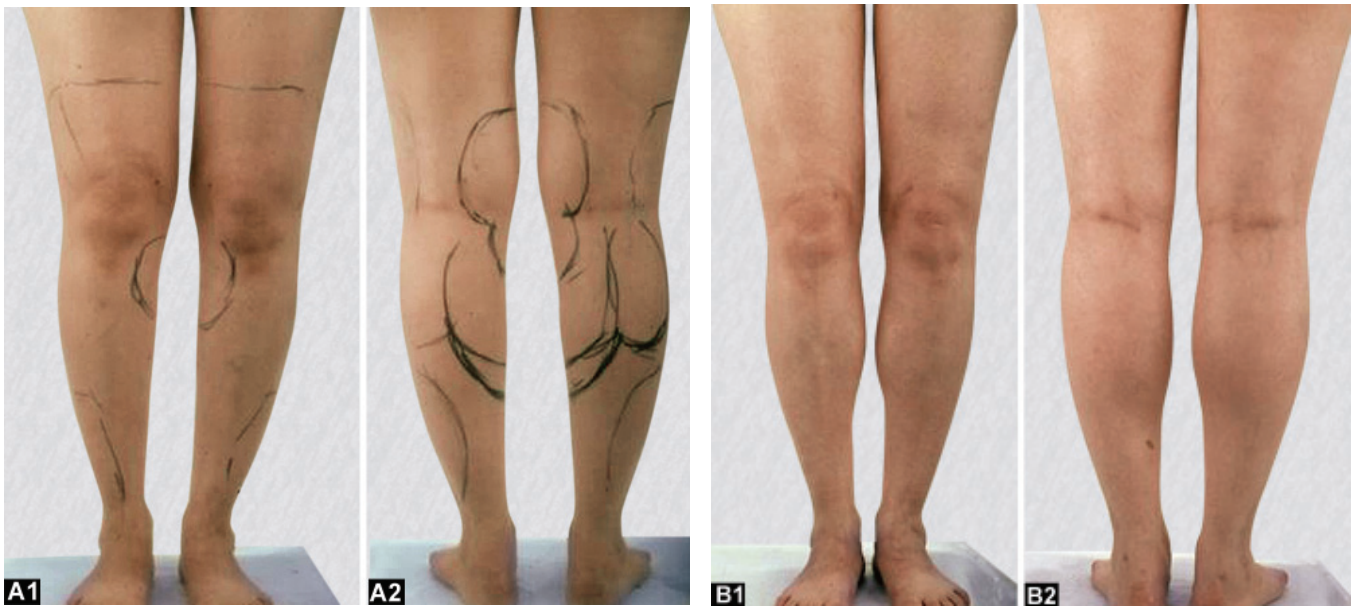


FIGURE 26-6
Combination of calf implants and knee liposuction. The approach is through the popliteal fold posteriorly and anteriorly from a medial incision above the patella



FIGURES 26-7A AND B
(A) Preoperative 27-year-old woman with calf underdevelopment and fatty lipodystrophy of the knees and lower thighs; (B) Postoperative appearance after calf implantation, and upper leg and lower thigh liposuction

the medial and lateral aspect of the Achilles tendon, if ankle suction is necessary. Once the suction has been performed in these areas, the patient is turned into a supine position and using a small incision in the medial aspect of the knee above the patella completion of liposuction of the knees is performed.

Chin Implants with Neck Liposuction

Patients seeking neck and chin liposuction often have chin underdevelopment. Chin implants, which are useful in correcting a poor appearance of the neck, will certainly be helped by liposuction.

Suction of the neck is performed as a starting procedure. It is done through one incision or two located at each end of the incision necessary for implant introduction.

The remaining part of the surgery is performed as usual for chin implantation. It is also possible to use an intraoral approach for the implant and perform the suction through a submental crease incision **(Figures 26-10 to 26-13)**.

FIGURES 26-8A AND B

(A) Preoperative female with small calves; (B) Postoperative following calf implants

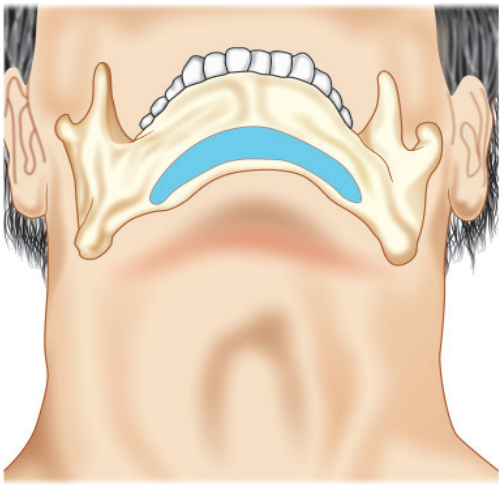


FIGURE 26-9

Drawing of the incision for a chin implantation associated with liposuction of the neck and chin

Bandages will help in compressing the implant and the zone that has been liposuctioned. Often the liposuction improves contour of the chin and neck in patients seeking chin implants.

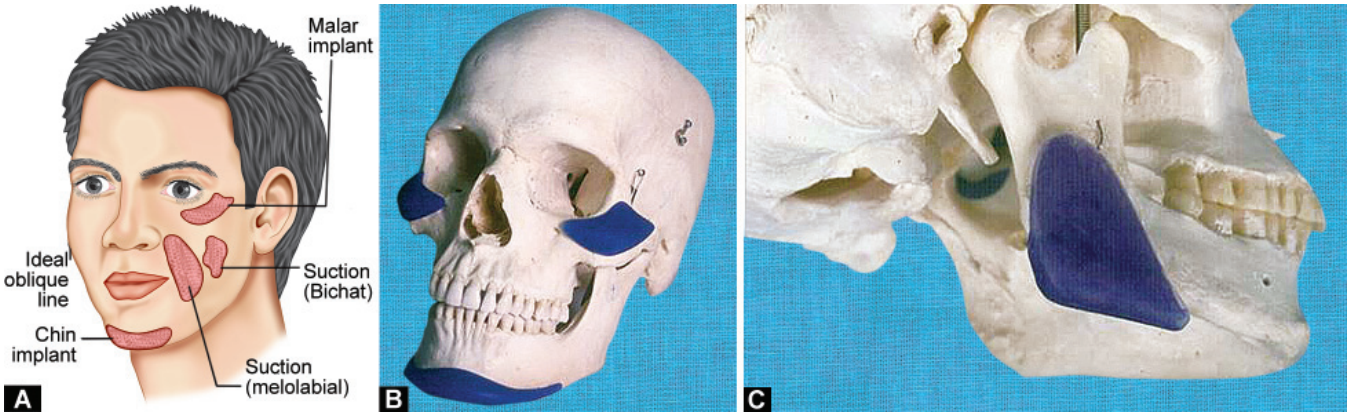
Malar Implants with Cheek Liposuction

Patients eager to have a chiseled facial look are thus desirous to show a malar and mandibular contour while the cheeks are hollow. This specific look is often more attractive in film or pictures than on live patients, and it is requested by people in the movie or modeling profession.

Bichat's fat pads can be extracted at the time of malar implants through the oral route. The combination of these two procedures enhances the results of each of them.

FIGURES 26-10A AND B

(A) Preoperative 33-year-old woman with chin underdevelopment and neck lipodystrophy; (B) Postoperative after neck liposuction and chin implant



FIGURES 26-11A TO C

Association of chin implant and malar implant combined with melolabial liposuction and liposuction of Bichat's fat pad

FIGURES 26-12A AND B

(A) Preoperative female with facial atrophy from aging; (B) Postoperative following chin and malar implants and liposuction

FIGURES 26-13A AND B

(A) Preoperative male with flattened malar areas and retrusive chin; (B) Postoperative after liposuction and implants to the malar area and chin

Mandibular Angle Implants and Cheek Liposuction

In patients who desire a very dramatic chiseled look, it is sometimes useful to associate the facial liposuction, either the subcutaneous fat or Bichat's fat pad, with mandibular angle implants thus obtaining the desired cheek shape and contour. As usual, the mandibular implant is performed through the oral approach with an incision over the anterior border of the mandible, and the implant is then placed at the angle. Using a skin incision below the lobule, liposuction of neck and cheek can be done to improve the chiseled appearance.

27 Modalities Beyond Simple Liposuction

Melvin A Shiffman

ABSTRACT

The evolution of fat removal has gone from simple excision to curettes and then liposuction with an electrical cutting cannula instrument that could be used with simple liposuction or with cutting of the fat globules with a blade or mainly simple liposuction. Further evolution led to ultrasound-assisted liposuction, power-assisted liposuction, and, at times, a return to cutting instruments. The techniques that evolved were to reduce scar and make liposuction easier to perform. Some of the ancillary techniques are discussed.

Introduction

Fat removal has evolved since removal of fat with a sharp curette reported in 1921[1] (although one case resulted in blood vessel injury of an extremity that necessitated amputation) to excision techniques, curettage and finally liposuction. There have been multiple instruments devised to make removal of fat through liposuction with small incisions easier for the surgeon and less traumatic to the patient.

External Ultrasound

External ultrasound (EU) may be used on tumesced areas immediately before liposuction to facilitate the procedure or to speed healing on follow-up visits during the postoperative period.

The application of ultrasonic energy to the adipose tissue effectively liquefies the fat, releasing a combination of triglycerides, normal interstitial fluid and the infused tumescent solution. These components form an emulsion, which can be removed using vacuum suction. Because of the predilection of the ultrasonic waves for low-density tissue such as fat, there is felt to be a selective targeting of fat cells without affecting the intervening connective tissue and neurovascular structures. The depth of penetration is inversely proportional to the frequency used. It is felt that ultrasonic energy affects the adipose tissue via several mechanisms: thermally, micromechanically and through the phenomenon of cavitation. Internal ultrasonic liposuction primarily utilizes the principles of cavitation. The exact mechanism by which EU affects fatty tissues is not currently clear; however, it is felt to be a micromechanical effect.[2]

Because of the problems associated with internal ultrasound the author has worked to develop the concept of EU.[3] External ultrasonic energy may be used preoperatively to produce a more favorable result without the side effects and complications associated with internal ultrasound. EU may also be applied postoperatively to reduce swelling and shorten the recovery course.

Any surgeon utilizing ultrasonic energy for any purpose should be knowledgeable about its usage and side effects as well as possible complications. Also, any ancillary

personnel should be adequately trained and experienced in the use of ultrasonic devices.

In 1989, Gasperoni presented subdermal superficial liposuction.[4,5] The technique consists of suctioning the superficial subdermal fat through small gauge cannulas (1.8–2.0 mm diameter) and then proceeding with the same thin cannulas to aspirate the deeper fat as well. The procedure is begun with a thin cannula and gradually increased in gauge. The advantages of using this technique include suction of the subdermal fat layer making it possible to obtain effective skin retraction; the treatment of all the layers of fat is made in an even fashion so that good results are predictable. It is possible to treat patients with slight adiposities as well as areas with small thickness of fat layers such as the ankles, and the procedure is similar for patients with large adiposities and those with small ones.

When subdermal fat increases its volume, the vertical septae of subdermal layer are stretched pulling the dermis thus giving the skin so-called "cellulite" aspect. Other skin dimples and hollows may be due to considerable irregularities of a firm deep fat or may be iatrogenic. In these cases and in regions where the fat is fibrous and hard, EU is indicated to soften the fat crushing it with the mechanical impact of its waves.[6-9] EU may be applied not only to the superficial fat but also to the deep one. This layer should be treated whenever the deep fat is fibrous and hard. When EU is used, care should be taken to infiltrate immediately under the dermis to facilitate the EU waves propagation in the superficial layer of fat. When the deep fat must be effectively reached by the EU waves, it must be infiltrated conspicuously to allow a successful cavitation induced by the EU. A thin layer of ultrasonic gel is spread on skin of the areas to be treated with ultrasound. The ultrasound is then delivered through a 3 MHz probe to treat the superficial fat and with a 1 MHz probe to treat the deeper layers. A 2 MHz probe may be additionally used when we must be sure that all layers are treated.

Low-level Laser-assisted Liposuction

Laser is defines as 'Light Amplification by Stimulated Emission of Radiation'. Neira[10-14] described use of the low-level laser to assist in liposuction. The laser used for liposuction is an external beam cold laser, electric diode with 635 nm wavelength that irradiates adipose tissue at 1.2, 2.4 and 3.6 joules/cm^2 at 2, 4 and 6 minutes exposure in each area.

Low-level laser energy has an impact on the adipose cell consisting of opening a transitory pore in the cell membrane which permits the fat content to go from inside to outside the cell. The cells interstice and capillaries remain intact. Partial disruption of the adipose cell has been observed. The irradiated cells were recultured and showed that they recover the normal anatomy and were alive.[15]

Nd:YAG (Neodymium:YAG)

The Nd:YAG laser is a solid laser formed by a granite aluminum yttrium crystal (YAG)[16] contaminated with an unusual soil (Neodymium) that emits an infrared band in 1064 nm. Histological studies were performed 30 minutes after laser lipolysis from a piece of tissue resected in a dermolipectomy.[17,18] It was possible to observe areas with necrobiotic adipose tissue with accumulation of lipophagic macrophages cells forming granulomatous lipophagic nodules. Twenty-five days after laser lipolysis it was possible to observe adipose tissue with breakage of the cell walls surrounded by histiocytes with foamy cytoplasm. There were also areas with scar fibrosis, and the nerve threads were intact. The use of the laser causes a destruction of the fat cell specifically protecting the nerves, while in a tumescent liposuction the fat cell is evacuated intact. The remaining tissue is immediately phagocytized by the macrophages and the immune system, while fibrosis covers and retracts the empty spaces.

Orthostatic Liposculpture

Orthostatic liposculpture was originated by Fischer[19] in order to perform liposuction in the same standing position as the markings are made. A table was developed that would bring the patient to a standing position for liposuction and could be reversed, if the patient became dizzy or faint.

Powered Liposuction

Development of Powered Liposuction Technology

The concept of using mechanical instrumentation with liposuction technology is as old as liposuction itself. Arpad and Giorgio Fischer introduced the concept of liposuction in combination with instruments they developed which they called the cellusuctiotome.[20] The Fischers' early instruments contained blades with moving internal components

designed to cut fat when it was aspirated into the cannula. Later, blunt cannulas were developed with side ports and other designs that aspirated fat with little blood loss.

Gross et al (1995)[21] used an existing cannula that had an exposed internal blade driven by a motorized handpiece, which was modified for use in fat removal. His "liposhaving" procedure was an open technique in which the fat harvesting unit was used for neck liposuction using submental incisions. Fat cells could thoroughly be removed from the platysma to allow for an even and complete fat extraction. This was revived in 2000 by Schaefer[22] using an endoscope rather than direct vision.

Coleman (2000)[23] developed an oscillating blade within a cannula that facilitates removal of fat.

The oscillating cutting cannulas demonstrated decreased work on the part of liposuction surgeon. This led to the development of a number of reciprocating cannula systems. The instruments contained a motor, driven either electrically or by air, which moved the tip of liposuction cannula forward and backward. These designs have been found to decrease the work of performing liposuction on the part of surgeon and increase the rate of fat removal.

Current Instruments

Flynn (2002)[24] clinically assessed available instruments and an independent engineering firm measured each instrument. Laboratory measurements such as the degree of torque, amount of heat produced, size and weight, amount of torque force, and degree of vibration were among the measurements taken by the independent engineering firm. A concise practical description of each instrument was featured. Stroke force was variable with instruments having a range of 9.5–30 pounds. The noise of the units varied between 60–87 decibels. Units produced variable heat with surface temperature measurements ranging from 77°F to 102°F. Build quality and reliability varied from instrument to instrument. The air-driven devices were clumsy and loud.

Coleman et al[25] evaluated the efficacy of powered liposuction. A variety of electrical and air-driven instruments were used. All cannulas were 3 mm in outside diameter. The amount of fat extracted was measured using a mucous specimen trap, widely used by respiratory therapists, in series between the cannula aspiration hose and the aspirator. They documented that there was increased efficiency in fat removal.

Ultrasound

Scuderi[26] and Zocchi,[10-14, 27-31] pioneered the application of ultrasonic vibration to fat emulsification and removal. The hope and objective of this effort was to create both technology and associated techniques that consistently produced a safer and more effective means of esthetic body contouring when compared to liposuction. The benefits of tissue selectivity were expected to produce a method of lipoplasty that was more 'fat specific' than the existing and well-known suction cannula. This technology and technique were named UAL for ultrasound-assisted lipoplasty.

The first generation UAL device was produced by the SMEI Company of Italy and utilized smooth, solid probes at a frequency of 20 kHz. The solid probes had a stepped design with diameters at the tip as small as 3.0 mm (small probe) and diameters at the base as large as 6.0 mm (large probe). The basic technique involved good surgical practice and two fundamental rules: (1) The essential use of a wet environment produced by infiltration of sufficient wetting solution and (2) constantly moving the probe to prevent thermal injury.[30]

Fodor (1998)[32] published his experience on 100 patients using a contralateral study model. His conclusions comparing SAL to UAL found no significant differences between SAL and UAL and failed to prove the claimed benefits attributed to UAL.

The UAL technique and instruments continued to evolve. Originally application times were long, significant complications were reported and safety was questioned[33-38] As application times were reduced, the complication rate declined. The concept of 'loss of resistance' became widely known as a realistic surgical endpoint. Rapid probe movement[39] was introduced as another means to safely control the energy presented by the second-generation machines. Results ranged from safe and effective use of UAL to high complication rates and questionable safety. A number of surgeons continued to use the ultrasonic instrumentation safely and effectively.[26-29,40-43] Their evolving technique allowed them to get effective results without the complications noted at introduction of the technology.

Vibration Amplification of Sound Energy at Resonance (VASER)

VASER-assisted Lipoplasty (VAL) is a third generation ultrasound-assisted liposuction. The VASER® system is highly selective for fatty tissue resulting in decreased overall damage to the vessels, nerves, structural tissues and lymph tissue. VAL uses ultrasonic frequency vibrations to emulsify the fatty component of tissue matrix but in a fundamentally different manner than earlier versions of ultrasonic instrumentation for lipoplasty. The VASER system delivers significantly less power to the tissues while

simultaneously increasing fragmentation/emulsion efficiency compared to UAL devices and eliminates the simultaneous aspiration feature of UAL devices.[44,45]

Water Jet-assisted Liposuction

Taufig (2000)[46] devised a method of water jet-assisted liposuction that allows a controlled and selective removal of fat tissue within the epifascial/subcutaneous area via usage of a cannula system. The technique uses energy of the pressurized fluid using a specialized cannula in which infusion tube and nozzle are integrated as well as a suction unit. An infinitely variable force pump dispenses the fluid in a controlled manner via a nozzle at the top of cannula system. The cannula is attached to a common and well-proven suction device for liposuction.

The water jet technique uses an isotonic sodium chloride solution with an additive of adrenaline in the ratio of 1 mL to 3 L of sodium chloride solution that is suctioned off almost at the same time as the dissolved fat particles.[47] Therefore, no side effects are being caused by the solution. This avoids a separate fragmentation step as with the tumescent technique.

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28 Medicolegal Aspects of Liposuction

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ABSTRACT

Liposuction has been considered to be a safe procedure. However, complications and deaths are occurring that are unnecessary and giving liposuction a poor reputation. Anesthesia, liposuction limits, megaliposuction and medications are discussed. The legal aspects of medical malpractice are described including medical negligence, standard of care, informed consent, patient rapport, handling complications and the angry patient. Legal cases are presented with comments on what happened and why.

Introduction

Liposuction has been considered to be a safe procedure.[1-4] However, complications and deaths are occurring that are unnecessary and giving liposuction a poor reputation. California has legislated means to reduce patient complications. Legal methods in controlling the problem are detrimental to cosmetic surgery. It is up to the plastic and cosmetic surgeons to reevaluate the procedure and find means to prevent further deaths. There should be a consensus of knowledgeable liposuction surgeons utilizing the peer reviewed literature and outcome statistics. Megaliposuction is one culprit that is being performed without adequate safeguards to protect the patient.

Fournier[5] has shown that megaliposuction can be performed safely in a hospital setting with continuous central venous and/or pulmonary artery pressure measurements as an aid in fluid management. Anesthesiologists generally are not prepared for the large subcutaneous fluid infiltration and resultant fluid shifts outside a hospital setting. There is no literature that has calculated the fluid balance problems in megaliposuction.

Should subcutaneous fluids be cold, room temperature, or warm? With large amounts of cold solutions, hypothermia is apt to occur and the problem of cryoglobulinemia or of disseminated intravascular coagulation (DIC) may become a factor. Are the physiologic solutions (saline) absorbed rapidly or in 8–12 hours as with lidocaine? Is the use of larger amounts of lidocaine (> 35 mg/kilo) necessary even with tumescent anesthesia? Certainly the use of over 35 mg/kilo of lidocaine is unnecessary in a patient having general anesthesia or intravenous deep sedation.

As dedicated cosmetic surgeons, we should endeavor to answer these questions and many more before we push the envelope of extent of liposuction any further. It is necessary to sit back right now and produce the statistics and problems being encountered in order to evaluate where liposuction is and where the dangers lie.

Anesthesia

Klein[6-9] has given liposuction a safer means of performing the procedure with less blood loss, and better results with smoother appearance and increased fat removal.[10] There

is also a reduced incidence of pulmonary embolism (fat or clot). The combination of lidocaine and epinephrine in a normal saline solution allows the use of local tumescent anesthetic to perform liposuction in situations where general anesthesia or intravenous sedation may be undesirable either by the patient or surgeon.

Lidocaine up to 55 mg/kilo has been shown to be safe,[11-15] but there are certain perioperative medications (cytochrome P450 inhibitors) which can reduce lidocaine metabolism and cause lidocaine toxicity.[16] In those situations where these medications have been taken inadvertently or are essential for the patient, general anesthesia or intravenous sedation can be utilized with reduced amounts of or without lidocaine in the subcutaneous infusion. Infusion solutions can be modified from 500 mg lidocaine and 1 mg epinephrine in 1000 ml normal saline to lidocaine 250 mg/L and epinephrine 0.5 mg/L with adequate hemostatic response and reasonable comfort with intravenous sedation.

Liposuction Limits

With the advent of tumescent technique, the reduction of blood loss has allowed an increase in amount of liposuction aspirate. The limit imposed by the "dry" (with local anesthesia only) or "wet" (limited amount of local anesthesia, epinephrine and fluid into subcutaneous tissues) techniques was 3,000 ml total aspirate. This was because blood loss (30% of the aspirate) would result in 1,000 ml of blood being aspirated with 3,000 ml aspirate plus blood in the tissues.[17] Blood replacement was recommended, if 3,000 ml aspirate was exceeded.

The tumescent technique of utilizing large amounts of subcutaneous fluid with epinephrine and lidocaine has decreased blood loss to almost 1% of the aspirate, thus allowing aspirates of 4,000–6,000 ml of supernatant fat without danger to the patient.[18,19]

Some physicians are attempting megaliposuction (exceeding 8,000–10,000 ml supernatant fat), although there is insufficient data to establish fluid requirements, blood loss, and need for hospitalization.[18] Only experienced surgeons with adequate monitoring and prolonged patient observation should be attempting this type of procedure. Caution would tell us to do the liposuction in two or three phases.

Other Dangers

Reports have shown that antiobesity medications may be a danger to any patient undergoing general anesthesia.[20] Sudden hypotension can occur with induction that responds only to neosynephrine and not to ephedrine.

Perforation of the abdominal wall with infusion cannula or a thicker liposuction cannula has been known to occur. Bowel, vascular or bladder perforation may be the result. The onset of peritonitis is heralded by increasing abdominal pain and should be recognized by the surgeon.

No matter how careful the surgeon is in performing such a relatively low-risk procedure as liposuction, there are always dangers of mishaps. The cosmetic surgeon should be aware of the risks and complications, know how to avoid them if possible, and certainly know how to treat them.

Requirements for Medical Negligence

The plaintiff's attorney must establish all four aspects of negligence in order to pursue a case of medical negligence.

Duty

When the physician establishes a relationship with a patient, the physician has a duty of due care in the care and treatment of that patient.

Breach of Duty

The physician may breach that duty by not using adequate skill and knowledge in treating a patient. This breach may be established by an expert witness testifying to the opinion that the defendant failed to follow the Standard of Care. The types of breaches may also include lack of informed consent. A lay jury may establish the standard if the facts are within the knowledge and experience of lay persons. This can best be seen in the case where a foreign body (sponge, instrument) is left in the surgical wound.

Injury

An injury, physical or mental, to the plaintiff must be shown by facts of the case usually through medical records.

Cusation

Causation requires that the injury to be caused by the breach of duty. In other words, the breach of the

standard of care may have been failure to place a breast implant under the muscle on the right side but the injury was capsule contracture on the left side.

Standard of Care

The standard of care is what a reasonably prudent (careful) physician would do under the same or similar circumstances. The court considers expert testimony to establish the standard of care in most instances, except if the circumstances are in purview of a lay person. Also, the court may consider what a responsible minority of physicians would do under the same or similar circumstances. Medical literature may help to establish standard of care.

The standard can also be what a reasonably prudent physician in a responsible minority would do under the same or similar circumstances.

Informed Consent

Definition

The patient has the absolute right to receive enough information about his diagnosis, proposed treatment, prognosis, and possible risks of proposed therapy and alternatives to enable the patient to make a knowledgeable decision. The patient is the one who makes all the decisions in opposition to the old paternalistic theory that gave the physician complete control over all decisions. A physician would now have to prove that the decision he made was because of the patient's inability to make the decision or because there was an extreme emergency.

Other requirements of the "Informed Consent" doctrine in law require that a complication which was not explained to the patient did in fact occur and that the patient would not have agreed to have the surgery, if informed of that particular risk or complication.

Legal Definition

In terms of surgical procedures, the surgeon must have explained to the patient the nature and purpose of any proposed operation or treatment, any viable alternatives, and the material risks and benefits of both. All questions must be answered.

In order for the plaintiff to succeed in a complaint for lack of informed consent, he must show:

- that the risk or complication, which was not explained to him, indeed did occur, and
- that if he had been informed of that particular risk, he would not have consented to the surgical procedure.

There are different means of proof at trial depending upon the jurisdiction (state). The opinion as to what risks is "material" to the patient in order to make his decision, under the same or similar circumstances, can be that of:

1. A reasonably prudent physician: This allows a physician to testify as to what is material.
2. A reasonably prudent patient: This allows the jury to decide what a reasonably prudent patient would consider material risks.
3. The plaintiff patient: This places the onus on the plaintiff to decide what would be the material risks. The cosmetic surgery patient may be unique because cosmetic surgeries are elective procedures and not medically required except, perhaps, for the patient's mental well being.

Patient Rapport

There is nothing as important as a good doctor-patient relationship before performing cosmetic breast surgery. This requires careful discussion with the patient concerning the surgical procedure proposed, viable alternatives, and the potential risks and complications of each procedure by a caring empathetic staff person or the doctor. The surgeon must, at the very least, give the patient the opportunity to ask questions of him/her to allow the patient to feel more comfortable with the person doing the surgery. Be careful when the patient is first seen by the surgeon on the day of surgery. This is not a good idea, if ultimate litigation is to be avoided. If a patient is coming in from a long distance or from another state, a consultation can usually be performed at least the day or night before surgery.

There should be strict control on all staff persons involved in the patient's care so that incorrect information is not given to the patient and that the patient is not told "do not worry". This requires detailed training of each of the office staff from receptionist to scrub technician and registered nurse on what to say and not say to patients and how to respond to patients problems.

No one should get angry with a patient or appear rushed. The patient should be treated with respect and dignity. Questions must be answered and phone calls should be returned in a timely fashion.

Complications

If a complication occurs, the surgeon should be available to talk to patient, examine the wound, and explain how

long it will take for the complication to subside. Every complication seen by the office personnel should be reported to the surgeon and he decides what to do.

Any complication can lead to a lawsuit even though it appears minor because the patient may think it to be major. Remember that the cosmetic surgery patient, despite all the warnings about possible complications, feels that there will be no complications and that he/she will look much better than they did before surgery.

The Angry Patient

If a patient shows anger, whatever the cause, the surgeon should try to handle problem in an expeditious manner. This means speaking with the patient to find out cause of anger and figure out ways to satisfy him/her. Avoiding this type of patient after surgery will frequently lead to litigation. This means answering all phone calls in a timely fashion, showing a truthful caring attitude, and seeing the patient frequently enough to satisfy the patient's needs.

Medical Record

Handwriting that cannot be deciphered should be avoided. Not only is this irritating to the attorneys and expert witnesses, but the State Medical Board may find this to be inadequate records and thus unprofessional conduct and loss of medical license may ensue. Handwritten notes are a continuous problem especially when years later the doctor who wrote the note cannot read it.

Typewritten notes are easy to read and usually contain much more information than written notes. This author dictates all of the medical record notes. The cost to get a microcassette for dictation and hire someone to take off the dictation will save the surgeon time with minimal cost including maintaining the medical license.

Legal Aspects

The first thing an attorney thinks is that a bad result is fault of the surgeon because of a negligent act. This may include claims of poor training, lack of skill, lack of knowledge or inattention during surgery. The attorney will seek out an "expert witness" to show a breach in the standard of care. The 'standard of care' is essentially a legal term meaning what a reasonable prudent (careful) physician would do under the same or similar circumstances. The defendant surgeon's attorney will try to find an expert witness to show that there was no breach in the standard of care. The surgeon should be realistic because everyone makes mistakes and the expert witness should not be biased and should give an honest opinion as to whether or not the standard of care has been breached.

Legal Cases

The following cases will illustrate some of the disasters in liposuction with comments.

Sousaris v Anonymous, Case No. 78-193-0105-96, Hawaii (1997)

This 48-year-old plaintiff's decedent had liposuction of the abdomen, flanks, pelvis, chin and neck on January 5, 1996. There was 2,500 ml of tumescent solution used and there was 3,450 ml total aspirate using a 6 mm cannula. On the 7th postoperative day, the incisions in the pubic area began draining fecal material. She was admitted to the hospital and had resection of a necrotic perforated segment of small bowel protruding through and incarcerated in a 1 cm opening in the abdominal wall, 5 cm lateral to the midline and inferior to the level of the umbilicus. Multiple abdominal wall debridements were carried out for necrotizing soft tissue infection. She developed DIC and adult respiratory distress syndrome and died on January 30, 1996. The plaintiff claimed that the defendant negligently perforated the abdominal wall and small bowel and pulled the small bowel loop through the abdominal wall opening with the suction cannula. The defendant claimed that an asymptomatic undiagnosed Spigelian hernia was present and the bowel loop was injured during the liposuction.

Comment

Although this case was lost at arbitration, there was no way that the Spigelian hernia could have been recognized preoperatively and, therefore, bowel perforation under these circumstances was unforeseeable. The Spigelian hernia is the only logical explanation of the events:

1. Seven days until intestinal content leakage occurred: It is usually seen when there is interruption of the blood supply of bowel loop with delayed perforation.
2. The 1 cm abdominal wall opening was in the precise position for a Spigelian hernia.
3. The 6 mm cannula would not have made a 1 cm abdominal wall perforation.
4. It is virtually impossible to pull a loop of bowel through a 6 mm opening in the abdominal wall with the liposuction cannula even with -760 mm of mercury vacuum.

5. Protrusion of a loop of bowel in an incarcerated hernia with scarring (as in this case) only occurs from longstanding herniation.
   The case is presently being appealed.

Medical Board of California v Matory, Tustin District, CA
Medical Board of California v Hoo, Tustin District, CA

The 46-year-old plaintiff's decedent had surgery on March 17, 1997. The surgeon performed liposuction of the arms, abdomen, flanks, thighs, calves and buttocks over a 6.5-hour period. A total of 14,500 ml tumescent solution was used consisting of Ringer's lactate, with lidocaine and epinephrine (concentrations not recorded). There was 10,900 ml of total aspirate. An endoscopic brow lift was performed over 1 hour and this was followed by a face lift for 3 hours. The anesthesiologist gave over 18,000 ml of intravenous fluids over the 10.5 hours of surgery, despite only an 860 ml of total urine output. At completion of the procedure, the patient was cold, edematous and nonresponsive. The paramedics were called and cardiopulmonary resuscitation started. At the emergency room the hemoglobin (Hgb) was 2.1 and hematocrit value (HCT) 6.85. Attempts at resuscitation were unsuccessful. Autopsy showed cerebral edema with compression of the medulla oblongata into the foramen magnum. Both surgeon and anesthesiologist had their licenses revoked.

Comment

The events that transpired are a combination of breaches in the standard of care by both surgeon and anesthesiologist. The surgeon should not have planned to do megaliposuction (> 10,000 ml aspirate) outside a hospital setting and without central venous or Swan-Ganz monitoring. The liposuction could have been performed in at least two to three sessions on an outpatient basis. To perform other cosmetic procedures for five and a half additional hours was unnecessary and risky. The surgeon should have forewarned the anesthesiologist to limit intravenous fluids since the 14,500 ml tumescent solution would be reabsorbed into the vascular system over a period of time. If 500 mg of lidocaine was in each liter of solution (Klein's formula), then there was 100 mg/K administered which probably would have resulted in lidocaine toxicity after 8–10 hours. The anesthesiologist never notified the surgeon that the blood pressure was low throughout the procedure and that there was a very low urine output. He should have understood and kept track of the fluid balance and not administered large amounts of intravenous solution. Even at the end of the procedure, when the patient was cold, edematous, and nonresponsive, the anesthesiologist did not notify the surgeon of all the problems except to say that the patient should probably be admitted to the hospital because of the prolonged procedure. There was failure to promptly notify the paramedics about the blood pressure instability and patient unresponsiveness, after the surgery was completed. There was no effort to check the Hgb and HCT after such a large liposuction procedure, and there was no attempt to warm the patient following liposuction part of the procedure.

Teillary v Pottle, New Hanover County (NC), Superior Court. In: Medical Malpractice Verdicts, Settlements and Experts. 1996;12(8):47 and 1996;12(11):46.

The plaintiff, a former nurse, had liposuction of the abdomen. She was seen postoperatively for abdominal pain, hospitalized and then released. She went to an emergency room shortly thereafter and was readmitted for surgery. The small bowel had 32 perforations that had to be repaired. There was a $490,000 settlement.

Comment

Persistent severe abdominal pain (not simply soreness) after abdominal liposuction is from perforated vessel or viscus, until proven otherwise. Bowel perforation during abdominal liposuction is a known complication of the procedure, especially if there are abdominal wall scars that can misdirect the cannula. However, sixteen different through-and-through intestinal perforations could only occur if the nondominant hand was not palpating the cannula tip (one of the principles of liposuction). Delayed diagnosis of the perforations probably contributed to the decision to settle.

Herron v Stewart, Forsyth County (NC), Superior Court. In: Medical Malpractice Verdicts, Settlements and Experts. 1995;11(10)47.

The 37-year-old plaintiff's decedent had liposuction of the face planned for December 1990. On induction of general anesthesia, cardiovascular collapse occurred. The patient

was revived after 40–50 minutes but suffered severe brain damage. She lived in a vegetative state for 2 years and died in January 1993. The plaintiff claimed that there was failure to timely diagnose and respond quickly to the cardiovascular collapse and that there was failure to follow proper medical procedures. There was a confidential settlement after the jury was deadlocked in June 1995.

Comment

Failure to timely diagnose and respond quickly to cardiovascular collapse is inexcusable. Every office performing surgery, even with local anesthesia, must be prepared for any emergency event, especially cardiac arrest. Brain damage or death is known sequelae of cardiac arrest even in the best of circumstances, but especially in an outpatient setting and not in a hospital.

Medical Board of California v Su, Sand Diego District, CA
Mondeck v Su, California

The plaintiff's decedent had lower abdominal liposuction scheduled for June 21, 1994. Preoperatively, she was given atarax 100 mg, prednisone 60 mg, valium 50 mg, ciprofloxacin 750 mg and augmentin 500 mg. The tumescent solution consisted of 500 cc Ringer's lactate with lincomycin 1,500 mg, keflin 1,000 mg, ciprofloxacin 100 mg, marcaine 240 mg, epinephrine 2.5 or 5 mg, and lidocaine (amount unrecorded). Approximately 200 ml of this solution was injected over 8 minutes despite a blood pressure of 74/57 just prior to the infusion. One minute later the patient complained of headache and then lost consciousness. The defendant claimed that epinephrine 1 mg intramuscularly (IM) was given and oxygen started. When the paramedics arrived 4 minutes later the patient was pulseless and cyanotic, no cardiopulmonary resuscitation was being given, there was no oral airway, and no oxygen was being administered. The defendant voluntarily surrendered her license to the Medical Board.

Comment

There is absolutely no need for multiple antibiotics for prophylaxis. Adding antibiotics to the tumescent solution increases the risk of drug reaction, and the absorption rate and length of action is unknown. There is no indication for the use of marcaine (bupivacaine) in tumescent solution, especially if lidocaine is in the solution. Marcaine bonds to the cardiac nerves and the possible effects include heart block, decreased cardiac output, hypotension, bradycardia, ventricular arrhythmias, ventricular tachycardia, ventricular fibrillation and cardiac arrest. Epinephrine is not absorbed when given IM in a patient in cardiac arrest. It should have been given intravenously. There was failure to timely perform essential lifesaving procedures such as cardiopulmonary resuscitation, to maintain adequate airway and to administer oxygen.

Medical Board of California v Greenberg, Tustin District, CA

In California, 31 cases of postoperative infection following liposuction were documented from one physician's office. Subcutaneous nodules appeared 1–6 weeks postoperatively in these patients. The nodules showed inflammation and then drained serous fluid and pus. *Mycobacterium chelonae* was cultured from 10 patients and *Mycobacterium fortuitum* from 1 patient. The heath department investigated the physician's office and noted that the liposuction tubing and towel drapes were washed, not sterilized, and reused.

Comment

It was ultimately learned that the liposuction cannulas, which were supposed to be heat sterilized, actually were not being sterilized properly. The individual kept in the office to sterilize and do the back office work was untrained except being told how to do things by her predecessor. In fact, the 20-minute heat sterilization cycle was being started when the autoclave was turned on and not when the proper temperature and pressure had been attained. It is the physician's responsibility to hire adequately trained personnel or otherwise do adequate training in office.

Medical Board of California v O'Neill

The 36-year-old female patient was 5'6" in height and weighed 249 pounds. On March 4, 1996, liposuction of the abdomen, neck and inner thighs was performed under intravenous sedation. Blisters on the lower abdomen were noted on June 9, 1996 and bacitracin ointment applied. On July 9, 1996, there was a huge red "bruise" on the lower abdomen and pustules in the pubic area. The patient's temperature was 101.4°F. Treatment with duricef was changed to augmentin. A diagnosis of cellulitis was made on August 9, 1996 at which time debridement of the abdominal wall and neck were carried out. The accusation was that there was failure to diagnose and adequately treat the infection.

Comment

On the 4th postoperative day, the diagnosis of cellulitis should probably have been made and consideration given

for intravenous antibiotics. For infectious disease, consultation would have been appropriate. Cellulitis is a superficial infection and would ordinarily not require debridement unless there is underlying necrosis. Late treatment of necrotizing fasciitis results in increased tissue loss.

Taylor v Graves, San Diego County (CA) Superior Court, Case No. 694348 Medical Board of California v Graves

The 50-year old, 5'4", 220 pound plaintiff had liposuction by the defendant. The hips, legs and abdomen were liposuctioned on December 12, 1994 removing 11,000 ml aspirate, and this was repeated at a second procedure removing 4,000 ml aspirate. The defendant had a medically untrained individual in his office who cleaned instruments and acted as surgical assistant but was known to have performed liposuction on other patients. The plaintiff developed postoperative urinary incontinence which her expert witness stated was caused by the liposuction trauma. The plaintiff claimed that the liposuction resulted in indentations and irregularities of the hips and abdomen which were from negligent surgical technique by an untrained healthcare employee of the defendant. The plaintiff also alleged that there was lack of informed consent and that liposuction should not have been performed on a morbidly obese patient. There was a confidential settlement and the Medical Board of California revoked the defendant's license.

Comment

The performance of liposuction is a medical procedure that can only be performed by a licensed physician. To allow anyone else to perform liposuction is considered as aiding and abetting the unlicensed practice of medicine, and the physician is subject to revocation of his/her state license. Liposuction in a morbidly obese patient may have poor cosmetic results, and this must be explained to the patient and recorded in the medical record. Surgical removal of redundant skin by some form of abdominoplasty may be necessary postliposuction, and this also must be discussed with the patient and recorded.

Medical Board of California v Chavis, Los Angeles District, CA

The 43-year-old, 4 feet 11 inch, 197 pound female had liposuction of the medial and lateral thighs, hips and abdomen. Five liters of tumescent fluid was injected (50 ml lidocaine, 1% epinephrine and 12.5 mEq sodium bicarbonate in each 1,000 ml normal saline). Aspirate was 3,500 ml with estimated blood loss of 300 cc and intravenous fluids of 3,000–4,000 ml. Versed 17.5 mg and stadol 3.5 mg were used over the 1 hour 50 minutes of surgery. Four hours postoperatively the patient wanted to get out of bed to sit in a chair. While in the chair, in the presence of her husband and the registered nurse, the patient became unresponsive. No breath sounds were noted, but the pulse was present. Mouth-to-mouth resuscitation was started, and the husband performed compressions when the pulse became no longer palpable. The paramedics took patient to the hospital emergency room (ER) where HCT was 8.1 and the Hgb 2.8. She expired after unsuccessful resuscitation at the ER. She had disseminated intravascular coagulopathy, hypothermia, anemia and pulmonary edema diagnosed at autopsy. The physician's license was revoked.

Comment

Marked blood loss is unusual when the tumescent technique is used, but it may occur. In this case, the surgeon gave the patient Aleve orally just prior to surgery. The physician should have known that NSAIDs can cause bleeding problems. When this patient had pulmonary arrest, there were not enough medical personnel in the office to perform cardiopulmonary resuscitation. In actuality, the husband had to do cardiac compression during the arrest which is totally unacceptable in a physician's office. The patient had been given 5,000 ml subcutaneous fluid and 3,000–4,000 ml intravenously over a 2-hour period of time which may have contributed to the pulmonary edema.

Anonymous vs Anonymous

In March, 1999, three female patients had liposuction for minor lipodystrophies in a dermatologist's nonaccredited office in Florence, Italy. Tumescent anesthesia was utilized, but there was no data on the contents of the solution. The cannulas used were sterilized by autoclaving at another clinic and transported to the office where the surgeries were performed. Within a few hours postoperatively, each patient developed high fever, nausea, vomiting and feelings of anxiety. Hospitalization in an intensive care unit was immediate. Blood tests showed infection to all three patients with blood cultures positive for *Staphyloccocus aureus* and *Pseudomonas aeroginosa.* Despite intravenous antibiotics and resuscitative measures, one patients developed renal failure followed by coma and pneumonia. She died after 1 week. The two other patients recovered following dialysis and 2 weeks in the hospital.

Investigation by local authorities showed the cannula to be free of contamination, but the saline solution used for tumescent anesthesia was contaminated from being left open for 1 week (not discarded). The physician was suspended by the College of Surgeons for operating in an office not authorized for surgical procedures. All three cases are presently being litigated.

Comment

All surgeries should be performed under sterile conditions. Liposuction is no exception. Caps and masks, with sterile gowns and gloves, and sterilization of the skin will help to prevent contamination. Proper sterilization of instruments is essential, and excess intravenous and tumescent fluids should be discarded, not reused. There tends to be a cavalier attitude by many physicians performing liposuction surgery that infections are so rare that indiscriminate contamination of the field by unsterile scrub suits and suction tubing will cause no harm. This, however, is a danger to the patient and is below the standard of care for a reasonably prudent (careful) physician. The postoperative nausea and vomiting might possibly be from lidocaine toxicity, but without the patient's weight and total lidocaine dosage, this cannot be properly evaluated. It would be unusual for the peak lidocaine level to occur a few hours after surgery. Total surgery time would have to be taken into consideration, since, with proper tumescent anesthesia of 2:1 or 3:1, the lidocaine serum level should peak from 8 hours to 10 hours after "administration".

Estate of Caswell v Daniel, Commonwealth of Kentucky Fayette Circuit Court (Eighth Division), Case No. 99-CI-1947.

The 30-year-old plaintiff's decedent had liposuction of the abdomen and panniculectomy on July 2, 1998. Four liters of tumescent solution was injected, and 4,475 cc aspirated. There was no written consent for liposuction. Two hours postoperatively, there was a significant drop in blood pressure to 80/47. He was given increased intravenous fluids. For the next 3½ hours, the blood pressure varied from a high of 105/68 to a low of 66/40. This was followed for the next 1 hour and 10 minutes by systolic blood pressures in the 70s. The patient was then transferred to the intensive care unit. Hematocrit ordered at 19:45 hours was reported at 21:00 hours as 30.9. Repeat hematocrit at 22:45 hours was 20.8. Packed cells were ordered at 00:05 hours on July 3, 1998, and transfusions begun at 00:15 hours. The patient had cardiac arrest at 00:30 hours and was pronounced dead at 01:35 hours. Autopsy showed the cause of death to be from exsanguination with 1,600 ml of blood in liposuction area of the abdominal wall, 400 ml in the scrotal sac, and extensive hemorrhage in the subcutaneous tissues extending to the back.

There was a settlement for an undisclosed amount.

Comment

Hypotension following a major surgical procedure is primarily caused by blood loss. Hematocrit should have been ordered 2 hours postoperatively when the first hypotensive episode occurred. The low blood pressure did not respond adequately to crystalloids. When the hematocrit was 30.9 at 21:00 hours, blood should have been given. Packed cells are not indicated for hypotension following blood loss unless albumin or Hespan is used at the same time. Whole blood is the better means of expanding the vascular volume. By the time the patient had severe hypotension for over an hour, there was little likelihood of survival because of irreversible shock from extensive tissue damage. A timely diagnosis and treatment of blood loss would have saved this patient's life.

Estate of Marinelli v Geffner, New Jersey Superior Court (1999). In: Medical Malpractice Verdicts Settlements. 1999;15(8):37.

The 23-year-old female plaintiff's decedent had liposuction by the defendant dermatologist in May 1994. One day following the surgery, the patient died from a pulmonary embolus. The plaintiff claimed that the defendant was negligent in failing to tell the decedent not to take birth control pills, and also applied the bandages in a manner, which cut off the circulation and caused blood clots to form. There was also a question raised about the use of liposuction in a woman weighing only 115 lbs. There was a $558,000 verdict.

Comment

It is essential that patients discontinue birth control pills prior to cosmetic surgery over 1 hour. Estrogens are a known cause of thromboembolism. Cutting off the circulation with bandages would result in edema of the extremity and possibly cause deep vein thrombosis. Liposuction can be performed in a patient of any weight and is dependent upon the abnormal location of the fat deposits rather than patient weight.

Donnell-Behringer v McCann, Los Angeles County (CA) Superior Court, Case No. VC26507. In: Medical Malpractice Verdicts Settlements Experts. 2000;16(8):50.

The 45-year-old plaintiff had surgery on her shoulder and liposuction in the defendant's outpatient surgery clinic. She had follow-up visits with the defendant on the 1st and 2nd postoperative days. On the 3rd postoperative day, the plaintiff was admitted to the hospital by another doctor for infection of the liposuction site that required surgery. The plaintiff alleged that the defendant negligently performed liposuction, failed to utilize proper surgical techniques and was negligent in postoperative care. The defendant claimed that he was not negligent, that the standard of care had been met, and that infection was a risk of the procedure. There was a $902,000 verdict that was reduced through MICRA (Medical Injury Compensation Reform Act of 1975) to $660,000.

Comment

Infection is a known risk of any surgical procedure. The fact that infection occurred and was not timely recognized by the surgeon despite regular office visits was enough to convince the Jury of a breach in the standard of care. Since the patient had to be admitted to the hospital and operated upon by another doctor, there is evidence that the infection was diagnosable by another physician within a day of having been seen by the defendant.

Trebold v Fowler, Dallas County (TX) District Court, Case No. 00-6073-D. In: Medical Malpractice Verdicts Settlements Experts. 2002;18(8):55.

The 44-year-old plaintiff had liposuction of the abdomen and thighs. Postoperatively discoloration and necrosis of the skin of abdomen and thighs developed that required debridement and packing. The result was disfiguring scars of abdomen and thighs. The plaintiff alleged breach in the standard of care. The defendant claimed that the plaintiff failed to follow postoperative instructions. There was a $291,000 verdict with the plaintiff 20% negligent.

Comment

Infection, necrosis and scarring are known complications of liposuction. Despite a lack in breach of the standard of care, the Jury found for the plaintiff possibly because of severity of the necrosis and scarring and prolonged recovery.

Medical Board of Texas v Ramirez, 1987

In 1987, a young 5 feet 1 inch, 117 pound female, had liposuction of the abdomen. No preoperative or postoperative antibiotics were administered. Two days postoperatively, the patient developed an overwhelming infection and sepsis. She was admitted to the hospital and treated with intravenous antibiotics but she died.

Comment

Sterility is a sine qua non of any surgical procedure. Instruments and wounds should be handled with strict sterile precautions. The cavalier attitude of some surgeons not to use masks, gowns, sterile drapes and a sterile surgical suite to perform liposuction risks patient lives. Liposuction causes extensive internal tissue damage and the standard of care requires perioperative antibiotics.

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